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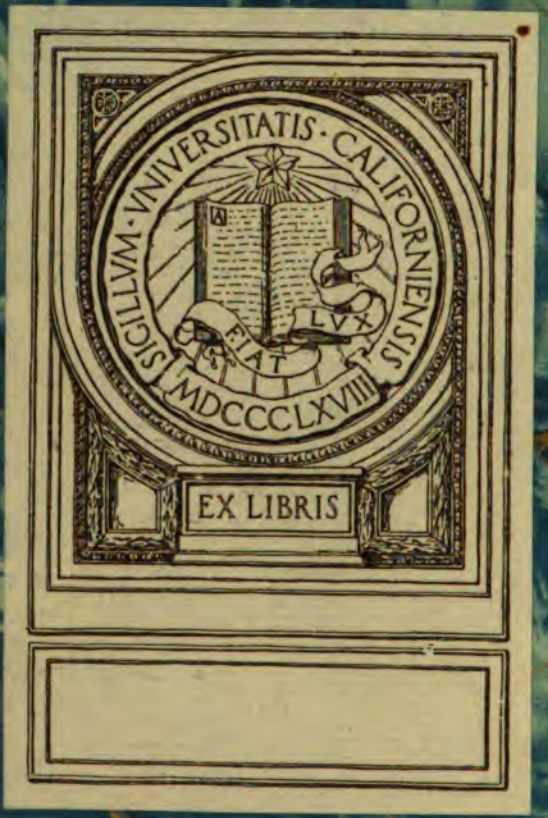
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VALUATION OF PUBLIC UTILITY PROPERTIES

BY

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PREFACE

At the present time there exists no general practice or well formulated theory of the valuation of utility property. This is indicated by the generally confused state of the public mind, the divergent views of those engaged in the work, and the contradictory positions taken by the public authorities and courts as to the proper basis of valuing such property.

Much important information relating to valuation work exists in various public papers, but heretofore there has been no comprehensive attempt to digest and compile this material.

The author has been engaged for several years past in valuing property aggregating hundreds of millions of dollars. He has devoted much time to the study of the opinions, papers, discussions, reports of commissions, and court decisions relating to the subject. He has endeavored in this book to digest this material, in so far as possible and to present a summary of the best practice, with typical examples thereof. The aim has been to indicate, if possible, the line along which theory and practice seem likely to be standardized.

No attempt is made to hold a brief either for the necessity of valuing property on the one hand, or the injustice of doing so, on the other. The work relates rather to approved methods of ascertaining values not only of tangible property, but of intangible property as well. It treats of appraisals which have become more or less historic, and have helped to establish the precedents of current practice.

Since it frequently happens that the valuations of utility property are submitted to the scrutiny of the courts, references are frequently made in this book to the judicial rulings which, though at times contradictory and somewhat confusing, nevertheless indicate the general lines along which valuations must be made in order to render then unassailable.

The author has made use in the preparation of this work, of papers which he has previously presented before engineering societies. These, however, have been revised and elaborated.

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Many other sources of information have been drawn upon, for which the author has endeavored to give credit, with due appreciation of the assistance and co-operation rendered by the various members of the accounting and engineering professions interested in this subject.

HENRY FLOY.

NEW YORK CITY,
April 2, 1912

CONTENTS

PAGE

PREFACE v

CHAPTER I.—INTRODUCTION 1
General—Purpose—Sale or Transfer—Fixing rates—Capitalization—Taxation—Accounting—Basis.

CHAPTER II.—GLOSSARY 13
Application of terms—Nature—Physical value—Scrap value—Wearing value—Service value—Present value—Original cost—Cost to replace new, replacement cost or cost of reproduction—Development expenses—Fair rate, fair value, fair return—Good will—Franchises—Depreciation—Classes of depreciation—Going value—Public utility—Averages.

CHAPTER III.—PUBLIC SERVICE COMMISSIONS 32
Utility commissions—Reasons for the creation of commissions—Results accomplished by commissions.

CHAPTER IV.—MAKING AN APPRAISAL 49
General—Cost of Appraisals—Inventory—Field inspection—Suggested procedure.

CHAPTER V.—STRUCTURAL COSTS 62
Unit prices—Contractor's profit—Fluctuating prices—Engineering, contingencies, omissions, etc.—Real estate—The sales method—Calibration of sales method—Final revised values—Block 131—Part of Block 126—Paving—Water power.

CHAPTER VI.—DEVELOPMENT EXPENSES, INTANGIBLE EXPENSES, NON-PHYSICAL COSTS, OVERHEAD EXPENSES. 91
General—Interest—Taxes—Insurance—Legal and organization expenses—Cost of financing—Working capital—Non-existant property.

CHAPTER VII.—FRANCHISES, GOOD WILL, GOING VALUE, CONTRACTS 129
Franchises—Good will— Going value—Application of principles outlined—Assumptions as to existing plant—Date of valuation—Construction period required—Going value development period—Beginning of operation—Character of plant and order of construction—Beginning of operation of different portions of comparative plant—New construction in going value development period ignored—Operations of comparative plant—Income on unemployed capital—Resulting going value under first trial computation—Recomputation unnecessary for the purpose of this paper—Effect of assumptions as to order of construction on loss of interest during construction item—Contracts.

PAGE

CHAPTER VIII.—DEPRECIATION 168
General—"Absolute" and "theoretical" depreciation—Depreciation accounts or reserve funds—Application of depreciation—Appreciation—Fifty per cent. method—Depreciation of non-physical values—Summary.

CHAPTER IX.—APPRAISALS OF PUBLIC UTILITY PROPERTIES IN GREATER NEW YORK 218
Third Avenue Railroad Company—Metropolitan Street Railway Company—Coney Island and Brooklyn Railroad Company—Kings County Lighting Company.

CHAPTER X.—EXAMPLES OF IMPORTANT APPRAISALS 333
Street railway properties in Chicago—Union Electric Light and Power Company, St. Louis, Mo.—Macon Gas, Light and Water Company, Georgia—Northern Pacific Railway, State of Washington—Beloit Water, Gas and Electric Co.

INDEX. 387

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VALUATION OF PUBLIC UTILITY PROPERTIES

CHAPTER I

INTRODUCTION

General.—Fifteen or more years ago, the appraisal or valuation of corporation property, was unusual. Inventories of supplies and apparatus for stock-taking or insurance purposes, were common, but valuations of property, in the sense that term is used at the present day, as the basis of sale, capitalization, taxation or the determination of proper rates to be charged for the service rendered, were unusual. The taking over by municipalities of privately owned water works may be said to have originated the present era of appraisals and valuations in America. Consequently the water-works engineers were the first of the profession to be drawn into this department of engineering and they have done much excellent pioneer work therein. More recently there has developed a frequent and importunate demand for the determination of the value of corporation property, in all lines, particularly that of so-called public utilities which has called for the services of other experts.

A very usual and normal method of ascertaining the value of privately owned property, is, and has been, to consider its net earnings in the present and its prospects for their increase in the future. It was customary to apply this same method in estimating the value of public utility properties, overlooking the fact that their operation and control was specifically limited by franchises and special laws under which they were originated, and that as quasi public organizations they were under obligations which did not apply to small competitive, private concerns. Individual initiative and the net profits accruing therefrom, in the case of industrial organizations, are largely modified and

restricted through competition, but no such limitation exists with respect to a corporation controlling a monopoly. The history of corporate control and operation of public utilities discloses the fact that, in very many cases, monopolistic control was used unfairly for the purpose of unduly increasing earnings, at the expense of the public, to permit flotation of securities for the enrichment of the individuals controlling the corporation.

The necessity, in certain cases, for ascertaining the amount of over capitalization of corporations serving the public regardless of whether the over capitalization results from ignorance, mismanagement or necessity, has developed the recent movement for ascertaining the real value of the property, "both used or useful" in serving the public. This necessity of ascertaining in individual cases the value of corporation property has, as so often occurs, extended until there is a very definite, though unnecessary, demand for the appraisal of all physical property used by public utility corporations, as if that were the whole measure of value. This extreme view is unwarrantable and would result in a useless amount of effort and expense with no necessary accompanying gain. At the same time there are occasions where appraisals of corporation property, both physical and intangible, are necessary and essential to permit a judgment as to the value of its securities or the fairness of its earnings. That this conclusion is correct is indicated by the very reasonable and common sense opinion of the Railroad Securities Commission, expressed in their recent report to the President. The quotation gives a very just and adequate expression of the place and importance a physical appraisal should hold.

"In so far as the value of the property is an element in rate regulation the outstanding securities are of so little evidentiary weight that it would probably be of distinct advantage if courts and commissions would disregard them entirely, except as a part of the financial history of the property, and would insist upon direct evidence of the actual money invested and of the present values of the properties. For this and other reasons discussed in the body of the report, your Commission recommends that the Interstate Commerce Commission should have authority and adequate funds to make a valuation of the physical property of railroads wherever the question of the present value of these roads is, in the judgment of that Commission, of sufficient importance. It is hardly necessary to add that your Commission does not believe that the cost of reproduction of the physical properties, however carefully computed, is the sole element to be considered in determining the

present value of a railroad, or that the outstanding securities could or should be made to conform to any such arbitrary standard.

"If railroad securities were to be issued only after express authorization of each particular issue by the Interstate Commerce Commission or other governmental agency, it is difficult to see how the Government can thereafter escape the moral, if not the legal, obligation to recognize these securities in the regulation of railroad rates. In view of the vast extent of the railroad systems of this country and the magnitude of the financial interest involved, both on the part of the railroads and of those who pay the rates, your Commission believes that the possible consequences of such a system of regulation are too serious to warrant its adoption at the present time."[1]

One of the causes of inquiry as to property values has resulted from a growing conviction that through unfair promotion, loose methods of financing, lack of proper maintenance of property or the rapid improvement and development of machinery, which has necessitated the abandonment of the old faster than its cost could be written off as a part of operating expense, capitalization did not represent or even approximately indicate the real value of the property fairly entitled to be considered in case of sale or the basis on which to figure earnings. Over capitalization may arise from a variety of causes. It may have come about in an entirely innocent way, as in some instances it is the result merely of ignorance; frequently it has been well-intentioned and even proper and necessary in order to rehabilitate worn-out or superseded property, funds for which could not be provided out of operating income; but in many cases, at least in connection with public utilities, it is the outcome of intentional, fictitious and unwarranted increase in securities through the putting out of stocks and bonds for the purpose of immediate, but what has now come to be considered, unfair profit.

There is much, evidently sincere but nevertheless mistaken opposition to the application of any method or theory of appraisal for determining physical, intangible or complete going values of public utility properties. Yet it must be clear that the amount of outstanding securities, their market value, the earnings of a corporation or the book costs of its property without consideration of what depreciation—if any—has taken place in physical property, do not, of necessity, indicate even approximately whether the capitalization of a public utility is proper or im-

[1] Report of the Railroad Securities Commission, 1911. Pages 38–39.

proper. "Cost is not synonymous with value," capitalization may be artificially large or small compared with the fair value, income may be excessive or insufficient to take care of proper charges, depending on rates, and the proper basis for determining these questions in relation to public utility property at least, is an appraisal of both tangible and intangible values. Physical valuation alone will not give the total fair value but it will usually give a relatively large proportion of the whole.

As illustrating the value that may attach to the non-physical part of a property, the testimony of Mr. Andrew Carnegie, recently, before a Congressional Committee, is interesting. Mr. Carnegie stated that he accepted $420,000,000 for property having a book value of $84,000,000, which created an impression in the minds of many, believing physical plant or book value expressed the worth of the entire concern, that Mr. Carnegie had accepted a "nuisance" value for his undertaking. But such was not the case, as Mr. Carnegie had several times stated that he valued his partners more than his plant, and that given his organization he would reproduce his plant in short order. That the organization was worth the amount paid for it, has been proven by subsequent earnings.

One cause for the prevalent objection to any appraisal whatever of utility properties arises on the part of those who, with a knowledge of the value of certain property, feel that unjust and unfair Court or Commission decisions have been made which were based on incomplete but so-called appraisals. But this is equivalent to blaming a court for rendering a decision based on the evidence introduced. If the corporations have failed to furnish evidence that substantiates anything except physical values or have put forward claims for non-physical values without adequate proof thereof, why should Courts or Commissions be criticised? It has been too often the practice to employ engineers to ascertain and testify as to physical values, leaving it to corporation officers, dealing in "glittering generalities," or accountants with records of original costs or attorneys in their briefs to attempt to approve non-physical values, these most intricate of all values. The result has been failure to secure recognition of and allowance for intangible values with consequent wrong done the owners through the errors or ignorance which can be charged only to officials or counsel. On the other hand, there exists a tendency on the part of the public and its representatives, to

forget, whatever may be accepted to-day as the correct theory of earnings to be properly allowed public utilities, that, with rare exception, it was the practice to grant franchises without expressed limitation as to the amount or basis of fair return, but rather to encourage investors with the expectation of larger profits than might be expected from ordinary commercial business. Consequently, to undertake to now cut down the earnings from public utility properties, to a basis comparable to that demanded by uninvested capital, as the return on the most secure investments, is as absurd and unfair to the original investors as to limit the value of utility property merely to physical plant values, omitting recognition of the intangible elements.

A sane and dispassionate view of what should be considered in ascertaining the fair value of utility property, was expressed by the Special Master in the Columbus case and is as follows:

"Fictitious values will be disregarded, improvident and unwise expenditures will not be taken into account, but only the fair value of the property will be used as a basis, including, however, in such fair value not only the tangible property devoted to the public service, but such intangible value as may be legitimate and may be justly, under all circumstances, credited to the producer on the one hand, and debited to the consumer on the other, so as to bring about the just compensation rightly belonging to the company, and legitimately to be paid for by the consumer.

"Necessarily the ascertainment of such value is in all cases a difficult matter, and its final adjustment by the court can rarely, if at all, be made with mathematical exactness. All the court can do is, from the evidence, to arrive at such a value as will, all things considered, be fairly equally just to both parties."[1]

The difficulty of ascertaining the value sought, is increased by reason of:

(*a*) The necessity of dealing with tangible or physical values, as well as intangible and wholly estimated values.

(*b*) The lack of an accepted theory, which results in confusion and non-uniformity, under new and sudden demands to meet unforeseen and unexpectedly developed conditions.

(*c*) The subject involves not alone the broadest engineering

[1] The Columbus Railway and Light Company *vs.* the City of Columbus. Circuit Court of the United States Southern District of Ohio, Eastern Division.

knowledge, but also some of the deepest economic questions, in both of which sciences but few men have wide experience.

(*d*) Engineers, who are the usual appraisers, due to the rapid, marvelous and revolutionary developments within recent years, have available in many instances, too few correlated facts and figures on which to base their conclusions.

(*e*) The results obtained under different conditions of operation are so varied, the experience of different engineers on which conclusions must be largely based, are so diversified, and finally, the training, personality and prejudices of many experts so largely qualifies their opinions, that unanimous conclusions have been impossible.

Purpose.—The usual object sought in undertaking an appraisal of a public utility property is to determine its value for purposes of:

(*a*) **Sale or Transfer.**—Where a utility property is to be sold to a municipality, corporation or individual, an appraisal probably covering the entire value of the property, certainly that of the physical plant, more or less exact, will be required by the purchaser before closing the sale. Such procedure would be in line with ordinary commercial business sense and indicates how essential a knowledge of the worth even of the physical property alone, is considered, despite the cry of those who argue that valuations of physical property indicate nothing as to real or commercial values. Important valuations for purpose of sale passed on by the Supreme Court are, for example, the Kansas City Water Works case and the Omaha Water Works case.

(*b*) **Fixing Rates.**—Rate regulation of utilities has become to be accepted as an unquestioned principal of present day civilization. Any public utility is therefore likely to have its rates questioned, passed upon and fixed by authorized public bodies. Preliminary to and necessary for an intelligent determination of a proper and fair rate information must be had, as to income and the fair value of the property rendering the service for which the rate in question is being fixed. These principals have been so frequently enunciated and established by rulings of various courts, including the Supreme Court, that no argument as to their validity is worthy of serious consideration. The extensive valuations of railroad property in the States of Minnesota and Washington, as well as much of the valuation work of the present Wisconsin Commission has been undertaken to determine proper

rates, and it is primarily for this purpose that valuation of all the railway properties in the country, by the Interstate Commerce Commission, is being urged.

(*c*) **Capitalization.**—In the past, both private corporations and public service companies have been permitted to issue and use, practically, any unlimited amount of securities which those interested in the organization, for any reason, thought desirable. The result has been an unfair inflation and undue "watering" of securities with consequent loss to investors and discredit to the properties so handled. With the recognition of the right on the part of the public to limit net earnings to a fair return on the value of the property used, there has resulted a strong feeling that capitalization should indicate the value of any given property so that the fair return on the property might bear proper relation to the return on capitalization. In consequence, Public Service Commissions and other bodies authorized to pass on and approve the amount of stock and bonds to be used by Public Service Corporations under their control, have quite generally insisted upon an appraisal of the property in order to intelligently determine the proper amount of capitalization.

Where securities are sought to be issued, in addition to amounts already outstanding, to cover property already in existence, appraisals are usually demanded. Where such additional securities are being used to provide funds for new property, the discounts at which the securities are to be sold and the disposition of the proceeds therefrom are comparatively easily regulated and are quite generally prescribed by public authorities having control of such matters. While it is the general opinion and usual requirement of public authorities that the issuance of additional securities is only warranted when additions to property, not the replacement or renewal of existing property, are to be made, nevertheless where income is not sufficient to provide for renewals and replacements, the cost of same through the sale of additional securities, has, under occasional and mitigating circumstances, been authorized and approved by Public Service Commissions and supported by opinions of the courts.[1] Allied conditions may warrant the recognition of capitalization covering property no longer in existence, even at the time of issuance, provided the

[1] Application of the Binghamton Light, Heat and Power Co. Case No. 74. Public Service Commission of New York, Second District, Vol. I, 1910, p. 831.

property, installed in good faith, has been abandoned through changes in the art, inadequacy to comply with local requirements or similar conditions, so rapidly and in such large amounts as to preclude the writing off of such investment without jeopardizing the finances of the corporation or doing injustice to the investors.[1]

The appraisal of the railroads in the State of Texas, as well as many of those made by the Public Service Commissions of the several States, have been made for purposes of regulation of capitalization.

(*d*) **Taxation.**—The value of property for purposes of taxation may be appraised on the basis of:

(*a*) Real estate.

(*b*) Going concern.

(*c*) Franchise value.

If the appraisal is made simply to determine the value of the real estate and personal property for purposes of taxation, the same as other city property, after proper ascertainment of full value, the local rate of equalization—that is the ratio of average value on which taxes are based compared to the value which property would bring under favorable conditions of sale—should be applied to the full value so that corporation property will be taxed on the same relative basis as other property.

Appraisal for going concern value of a corporation may be made to ascertain the proper basis for taxation based on the value as an operating entity. Sometimes this form of tax is based on gross or net income. Sometimes on the output of a generating station or the car-miles run.

Appraisal for the purposes of determining the proper amount of franchise tax might apply simply to the value of the property in the public streets, as is the case, for example, in New York State in determining the special franchise tax.

There may be other considerations depending on local conditions which would require still other division of corporation property but the instances cited indicate the necessity of having carefully in mind the purpose for which the appraisal is to be made and classifying and valuing the property accordingly. The Wisconsin and Michigan State appraisals of the steam roads were for purposes of taxation.

(*e*) **Accounting.**—Where uniform systems of accounting are

[1] The Milwaukee Railway and Electric Light Co. *vs.* City Milwaukee. 87 Fed. 577

introduced as is frequently the case where Public Service Commissions are first created, it may be desirable or necessary to appraise property for the purpose of furnishing a basis for opening accounts or revising methods of bookkeeping.

Basis.—It has been quite generally stated by the courts that no single basis of valuation is to be used alone for determining the fair value of public utility property. The general rule is well set forth by the Supreme Court of the United States where it says:

"The basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a public highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public."[1]

In order to determine that value, the Court says:

"The original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under the particular rates prescribed by statute and the sum required to meet operating expenses, are all matters for consideration and are to be given such weight as may be just and right in each case."[2]

It is probably impossible to absolutely and exactly fix in dollars and cents, the value of the various elements going to make up a utility property. This is clearly illustrated in decisions of commissions, as for example the Wisconsin Commission says in one well-known case:

"From what has thus been said it appears to us that for the purposes of this case it is equitable to all concerned to allow the respondent reasonable returns in the way of interest and profits on a valuation of about $412,000 for the gas plant and of about $535,000 for the electric plant. The rates of returns that should thus be allowed will be explained later."[3]

Again the Public Service Commission of New York, First District, disapproving the plan of re-organization of the Third Avenue R. R. Co. says:

"The amount for development charges will be about $3,500,000."[4]

[1] Smyth *vs.* Ames, 169 U. S. 466.

[2] Smyth *vs.* Ames, 169 U. S. 466.

[3] State Journal Printing Co. *vs.* Madison Gas & Elec. Co. Decision dated March 8, 1910.

[4] Case No. 1181. Decision dated July 29, 1910.

The basis on which a valuation is to be made and the way it is to be used, must be carefully considered and kept in mind when making an appraisal. It is possible that a given valuation, when completed, may be used equally well for several purposes, but not necessarily so. From every standpoint, the cost of reproduction, or the original cost or the scrap value of a given piece of physical property at a given time or place, may be accurately determined. That is mainly an engineering question but the "fair value" of utility property will vary for the particular time and case under consideration. The determination of the fair value of a given property to be used as a basis for fixing proper returns or rates to be charged, depends upon the value of the property being used in the service from which the returns or rates are earned and is ofttimes quite different from the fair value of the total property of any utility, part of which may be held for future extensions or profit or use for extraneous purposes, but all of which would have to be considered and allowed in case of capitalization or purchase or sale, as a whole.

Ex-Commissioner of the Public Service Commission of New York, First District, Mr. Ed. M. Bassett, says:

"If it is decided that a public utility should be taxed on its total value as a going concern—that is, its commercial, market or sale value—then franchise and going value will be included. If, on the other hand, the public-utility plant is to be taxed precisely as other real estate, the cost of reproduction less depreciation will be the basis. There is no inherent inconsistency in using one method of valuation for tax purposes and another method for rate purposes. The tax, by whatever method assessed, is considered an operating expense in fixing rates, and is therefore borne by the user of the service wherever rates of charge are strictly regulated. Methods of ad valorem taxation must be worked out with an eye single to what is just and practicable in taxation, and methods of valuation for rate purposes must be worked out with an eye single to what is just and constitutional in rate making."[1]

"Different methods of estimating the value of property may properly be employed when it is valued for different purposes. When a valuation is placed on property which has become affected by a public use, for the purpose of ascertaining whether the maximum rate of compensation fixed by law for its use is reasonable or otherwise, it is obvious that the income derived therefrom by the owner before it was subjected to legislative control cannot always be accepted as a proper test of value because

[1] National Association of Railway Commissioners, Washington, D. C., Oct. 10–13, 1911.

the compensation which the owner charged for its use may have been excessive and unreasonable. Again, when property has been capitalized by issuing stock, neither the market value nor the par value of the stock can be accepted in all cases as a proper criterion of value, because the stock may not represent the money actually invested, and furthermore because the property may have been capitalized mainly with reference to its income producing capacity, on the assumption that it is ordinary private property which the owner may use as he thinks proper without being subject to legislative control. On the other hand, however, when property is valued for the purpose last stated, it is clear that the owner thereof is entitled to the benefit of any appreciation in value above the original cost and the cost of improvements, which is due to what may be termed natural causes. If improvements made in the vicinity of the property, the growth of city or town where it is located, the building of railroads, the development of the surrounding country and other like causes, give property an increased value, the owner cannot be deprived of such income by legislative action which prevents him from realizing an income commensurate with the enhanced value of his property."[1]

To illustrate the preceding, all will agree that valuation for tax purposes must be conservative. The price an article would bring at forced sale or during times of financial stringency, perhaps 70 to 85 per cent. of reproduction cost, would be quite generally accepted in American cities, as a fair basis of value for purposes of taxation. If value as security for a loan were being sought, an appraisal would determine the price that could be obtained aside from consideration of the particular circumstances under which the plant was installed. The security value would possibly not exceed 40 to 50 per cent. of reproduction cost, because the most "fluid" securities, namely, stocks listed on the exchange, are not accepted as collateral, at a figure exceeding 75 to 80 per cent. of quoted prices. On the other hand, an investor furnishing the cash and taking stock and bonds in return, will usually and very properly insist that the value of the property is the par value of the securities conservatively issued, although sold at some discount. Thus it will be seen that there may be and easily is a fair and honest distinction between what may be determined as the fair value of property for capitalization, safe taxation or rate fixing purposes. And yet for each value qualified as to its exact meaning, there should be but one figure which is the result of a fair, competent and unbiased conclusion based

[1] Cotting *vs.* Kansas City Stock Yards, 82 Fed., 839.

upon all the facts in the case. Of course, absolute accuracy in appraisal work is out of question. All human beings are liable to make errors and the engineer is not an exception. As far as possible, the personality of the men employed in valuation work must give way to automatic, self-regulating, uniform methods that eliminate the personal element, and focus on attaining the single figure which alone is correct.

As the value of a large proportion of all utility corporation property is the result of engineering skill and effort, engineers have naturally been called upon to estimate and determine the values in question. The ascertainment of the value of the intangible property, as well as plant value is essentially an engineering problem, because engineers of proper experience and qualification are best informed, not only as to construction cost, but also as to the expenses involved in getting a property started, and building up an income producing business. This larger field of valuation work, however, has put new responsibilities upon the engineering profession, demanding something more, in the way of knowledge of values, and questions of law and economics, than mere construction has ever before required.

So-called appraisals have been and are being made which, while perhaps adequate for the purpose intended, are little more than approximate estimates, completed within limited time, lacking in detail and thoroughness of preparation and yet are being used as an exact basis of property valuation. Such estimates should be clearly indentified as to their completeness and accuracy, both in justice to their makers and the owners of the property. Harm has been done by the misuse of such so-called valuations.

An appraisal to be reliable and capable of standing the test of cross-examination and appeal to the courts must be prepared with elaborate detail, care and exactness. The importance of making a full and careful inventory with a thorough investigation as to local costs of labor and prices for material is not usually appreciated by those newly interested in appraisal work. Too great emphasis cannot be laid upon this preliminary work necessary in making any trustworthy valuation.

CHAPTER II

GLOSSARY

Application of Terms.—The recent and rapid growth of valuation and appraisal work has caused the development of new terms or the modification of old ones. Confusion of ideas, difference of opinion, lack of experience, new and sudden demands have resulted in non-uniformity and even contradictory use of certain words by the engineering and accounting profession so that some definition, of terms as used by the author, is necessary.

One of the Committees of the National Electric Light Association some time ago undertook to correlate definitions of the terms used in connection with the subject of depreciation, which of course will include many, if not most, of the terms used in the broader subject of valuation. It has been suggested that some of the other National organizations, for example the American Institute of Electrical Engineers, undertake the classification and proper definition of terms used by the engineering profession in appraisal work, but thus far nothing has been done by that organization.

As the result of a suggestion in a paper on "Depreciation as Related to Electrical Properties," read before the American Institute of Electrical Engineers in 1911 in which certain application of terms was proposed, there resulted, in the discussion following said paper and in the Technical Press thereafter, considerable expression of opinion as to the proper meaning of terms used in connection with appraisals and the subject of depreciation, but the chief result was the disclosure of a wide diversity of opinion and considerable variation in the use to be made of many expressions commonly employed in connection with this class of work.

The author begs to offer the following explanation and definition of terms as that expressing the more usual meaning applied, by engineers of standing, to their use of the terms indicated.

Value.—Academically the word "value" relates to "barter and exchange" exclusively. Writers on Political Economy,

such as John Stewart Mill, have economically defined "value" as a ratio between demand and supply at a given time or place for a commodity or service, or a ratio between the demand and supply at a given time and place of another commodity or service. But one of the principal causes of demand—there are several—is usefulness or utility, consequently "value" may properly be used to measure utility. Even the utility of such an "unexchangeable and unbarterable" article as the human hand, when severed from the body, is measured in dollars by the jury making an award. In valuation work, as a rule, loss of utility results in loss of value, maximum utility determines maximum value. The ratio of existing to possible utility, measures by the same ratio applied to cost, existing value, in dollars, of the commodity or service.

Aside from any attempted definitions which may be purely academic or put forth as a species of mental gymnastics, engineers engaged in valuations and appraisals agree that utility has a value which may be expressed in dollars and this is the value; not a sales value, *i.e.*, the price which an individual article would bring if offered for sale; which is to be determined in making an appraisal. If the term related exclusively to barter and sale, only second-hand or scrap values would be considered, which is not the basis on which any appraisal has been or is being made for determining fair values of the "used and useful" property belonging to an operating organization.

Physical Value.—As the term indicates, physical value relates to material things or substances, the property which can be "seen and felt." It includes, primarily, "those things which are visible and tangible, capable of being inventoried," but secondarily, certain non-physical charges "which are an inseparable part of the cost of construction but which do not appear in the inventory of the completed property."

These secondary values which are usually included as a part of the physical property are expenditures for such items as:

1. Engineers' and architects' fees, including cost of design and testing all construction and equipment, etc.

2. Administration expenses chargeable to construction, including superintendence, inspection, accounting, salaries of officers and clerks, consents of authorities and property owners for temporary work or use, legal expenses, rent, printing, storeroom expenses, etc.

3. Provision for various incidentals and contingencies, in-

complete inventories, unforeseen requirements, etc., which practical experience has shown to be necessary.

It may be questioned whether the expenditure for such intangible items as engineering and architects' fees, administration and local expenses and charges of such character should logically be included as a part of the physical property or more properly classified with what are hereafter known as "Development Expenses." But it is becoming the general practice to consider these expenditures which are usually a fairly uniform and definite percentage of the cost of the machinery, buildings, and other equipment should very properly be included and made a part of the so-called physical values leaving the other intangible costs which vary widely with the different properties under consideration, depending on local conditions, magnitude, method of financing, etc., for a separate classification called development items or expenses.

It must be clearly understood that these intangible expenses, whether classified as a part of the physical cost or separated under the head of Development Expenses, are all necessarily and indisputably a part of the total cost of the completed physical property.

Scrap Value.—All physical property has a certain scrap or junk value, a "barter and sale" minimum basis beyond which there is no depreciation, hence physical property can only deteriorate until it reaches its scrap value. This value is simply the fair market price that a purchaser will pay for the property in its disintegrated condition. If a property consisting of its several elements is usable not as junk but as serviceable property elsewhere, a higher price than scrap value is obtainable, and this worth has been characterized as "salvage value" or "minimum going value." If the cost of removal and transportation to its market exceeds the normal junk price of an article, then the scrap or junk value becomes negative and the article is valueless.

Wearing Value.—If from the cost—taken on whatever basis is determined to be the correct one—there is subtracted "scrap" or "salvage" value of given physical property, the remainder is a value known as "wearing value," which will deteriorate more or less rapidly and entirely pass away, as regards the installation being considered, at the expired life of said property, which life ceases through physical decay, inadequacy, obsolescence or sudden damage.

Service Value.—Physical property, honestly and intelligently purchased with a view to its suitableness for the service intended, aside from some hidden defect or untoward accident, generally maintains its original utility and hence its value, for the purpose of use, practically throughout its life, except for such deterioration as results from wear and tear or deferred maintenance. The life of the property may expire normally through age or prematurely through inadequacy or obsolescence but these two latter classes of depreciation develop quickly so that for the larger part of the time used, the service value of property will approximate the cost. Service value must not be confounded with going value. Service value results from the use of the property in the place and for the purpose for which it was intended. Going value may or may not accrue in addition to, and, over-and-above service value. Going value relates to establishment of earnings while service value exists regardless of earnings.

Present Value.—This expression refers to the estimated value of the physical property as it exists at the period being considered. It may have one of several values, some purely academic and artificial as explained more fully hereafter, depending on what application is made of the theory of depreciation and, therefore, present value always needs some qualification or explanation as to the sense in which the term is used. The more frequent application of the term is to that value obtained by deducting, from "original cost" or "cost to reproduce new," the total depreciation, which may be either absolute depreciation or, as used by some authorities, the sum of both absolute, or accrued and theoretical or estimated depreciation. Though usually so, "present value" does not necessarily include a deduction from cost to cover deterioration as is illustrated in the valuation of the Texas Railroads made by the Commission of that State, where no deduction from cost of reproduction was made on account of existing wear and tear or normal deterioration.

Appreciation as well as depreciation must be considered in determining "present value" as indicated by the Supreme Court.

"And we concur with the court below in holding that the value of the property is to be determined as of the time when the inquiry is made regarding the rates. If the property, which legally enters into the consideration of the question of rates, has increased in value since it was acquired, the company is entitled to the benefit of such increase."[1]

[1] Wilcox *vs.* Consolidated Gas Company, 212 U. S. 52.

"Original cost" or "cost of reproduction new," in connection with depreciation of the physical property inventoried is quite generally used in determining present value, but in this connection it is interesting to note the unique opinion of the Iowa Supreme Court, which in view of the numerous decisions of other courts can hardly be considered a safe precedent to follow:

"The contention illustrated how inequitable would be a rule arbitrarily fixing the value as that for which a system might be replaced. Aside from this being impractical it may safely be said that there is hardly an enterprise of this character which, were it destroyed, would be restored as it was before. In ascertaining values in this way, the worth of a new plant of equal capacity, efficiency and durability, with proper discounts for defects in the old and depreciation for use, should be the measure of value rather than the cost of exact duplication."[1]

In estimating "present value" it is perhaps unnecessary to state that "barter and sale," "the price it will fetch," "second hand," "scrap" or "forced sale" values are not the "fair values" to be considered in connection with a "going concern." This has been repeatedly affirmed by the courts, as indicated, for example, by the following decision from the Supreme Court of Maine.

"Now what is the property which the district has taken by power of eminent domain? In the first place it is a structure, pure and simple, consisting of pipes, pumps, engines, land rights, and water rights. As a structure, it has value independent of any use, or right to use, where it is, a value probably much less than it cost, unless it can be used where it is, that is, there is a right to use it. Nevertheless, it has value as a structure. But, more than this, it is a structure in actual use, a use remunerative to some extent. It has customers, it is actually engaged in business, it is a going concern. The value of the structure is enhanced by the fact that it is used in, and in fact is essential to, a going concern business. We speak sometimes of a going concern value as it is, or could be, separate and distinct from structure value—so much for structure and so much for going concern. But this is not an accurate statement. The going concern part of it has no existence except as a characteristic of the structure. If no structure, no going concern. If a structure in use, it is a structure whose value is affected by the fact that it is in use. There is only one value. It is the value of the structure as being used. That is all there is of it."[2]

[1] Cedar Rapids Gas Lt. Co. *vs.* City of Cedar Rapids, 120 N. W.

[2] Brunswick and Topsham Water District *vs.* Maine Water Co., 99 Maine, 371.

In obtaining the depreciated or present value of "used or useful" property, worn out or replaced but still inventoried material, which has no value except for sale, may be put in at scrap or salvage value, unless such property is being carried merely to artificially increase values.

Original cost is usually taken to mean the actual expenditures made for physical property, including original construction and usually all additions since that time. The term is taken to include those items which are classed as "Development Expenses" and occasionally even the value of franchises, good will or going value. Original cost should be shown in the books of the corporations but it is not always there obtainable. Often because of casualty by fire or flood or frequent mergers, consolidations and reorganizations, old records have been lost and sometimes they have purposely been destroyed in order to obliterate the original cost of the property. Of course, original cost may or may not bear any relation to the present worth of the property being considered. The value of real estate for example may have appreciated largely so that its original cost bears no relation to its present value; on the other hand machinery and equipment may have been worn out and replaced by additions without writing off the value of the original property, no longer in existence. Proper bookkeeping methods would of course provide for the increase or reduction of the capital account as property is added or abandoned and discarded, unless possibly the earnings have been so small as to preclude, without unfairness to the stockholders or bankruptcy to the corporation, the inclusion, as a part of operating expense, of the value of property added to replace that already a part of the capital account.

Cost to Replace New, Replacement Cost or Cost of Reproduction.—These terms, so much in evidence nowadays and recognized by the courts, refer to an assumed value based on the estimated cost of reproducing the property new on the basis of prices current at the time of estimate—prices that fluctuate considerably are averaged for five years preceding the date of the appraisal—and is made up to include everything that can be inventoried regardless of original cost, age, service value or present condition as effected by depreciation. Novices in appraisal work frequently fail to appreciate that the terms here being considered refer exclusively to the cost of replacing exist-

ing (with due consideration for inadequacy and obsolescence) physical property by new property of a type in all respects identical with the old. The terms do not refer to the substitution of a different type capable of rendering equivalent service or of equal utility, that would call for new design, improved apparatus, concerning which engineers would differ widely.

Of course, a defect in the reproduction cost theory is that a utility cannot buy its materials, labor, property at average figures but must make its expenditures when times, and conditions or ordinances may require, often during periods of prosperity which consequently means during periods of inflated prices.

Development Expenses.—In connection with the establishment of any utility property as an operating entity, there are certain expenditures necessary for developing and completing the physical structures aside from the expenses of developing the business and producing an income. The former may be classed as "Development Expenses" and the latter as "Going Value," but both items are apart from and in addition to those expenditures relating to the cost of the physical plant. As a class, these expenses are sometimes referred to as "over-head charges," more frequently as "intangible expenses," but as they refer largely to the outlay necessary in getting the physical plant running, the author prefers the quite commonly used term "Development Expenses" which generally cover most or all of the following expenditures.

1. Legal and other expenses of preliminary promotion, incorporation and organization, procuring consents of property owners, condemnation proceedings, obtaining franchises, consents and certificates from Public Service Corporations and other public bodies, sometimes title examinations and insurance.

2. Technical expenses in connection with preliminary work, surveys, expert estimates, etc.

3. Interest on capital and bond issues, wages of superintendence and administration not chargeable to construction ordinarily necessary in connection with putting a property in going order; and also sometimes the deficiency in operating expenses and taxes until the property is put on a paying basis.

4. Taxes of various amounts including corporation tax, mortgage tax, real estate tax, personal property tax, capital and

State tax, franchise tax, etc., which must be provided and paid until the property is completely a "going concern."

5. Discounts on securities, brokerage or other customary and necessary expenditures in connection with financing such an undertaking and marketing securities.

6. Reasonable promotion profit, possibly also compensation for risk of capital.

7. Working capital.

It will be recognized in connection with the above items that although intangible in nature and having nothing to show therefore which can be "seen and felt," nevertheless these expenditures are just as definite, just as necessary and just as indisputably a part of the whole value of corporation property as are the physical elements.

Fair Rate, Fair Value, Fair Return.—The word "fair" implies justice. What may be a just and fair rate, a fair value or a fair return under a given set of conditions may be equally unreasonable and unfair under other conditions of climate, density of population, cost of fuel or labor and other modifying circumstances. Gas, sold by the cubic foot in both places, does not contain nearly as many heat units in Denver, Colorado, by reason of being about a mile above sea level, as does the same volume in New York, consequently the same price per thousand feet in both places, means nothing. Fuel at Norfolk, Va., will produce the same amount of steam at half the cost, compared with Boston, Mass. The prevalent state laws requiring a uniform 2 cent passenger fare per mile without regard to cost of construction, quality of service or density of population results in handsome earnings for some railroads and serious deficiencies for others. Rate legislation and attempted regulation without critical study of local conditions or a full analysis of operating statistics will never result in a fair rate. The determination of what may be a fair rate under given conditions is a complex question. It depends upon two fundamental facts to be ascertained.

First.—On what is a fair value for the property being used.

Second.—On what amount of return beyond operating and all other expenses it is fair to allow the owners for the use of their property.

Thus it will be seen that all considerations are qualified by the

adjective which is applied so easily, but the exact limitation and definition of which, for any particular case is always difficult and oft times impossible of exact ascertainment. The courts have held that before deciding what in a given case may be a fair rate, it is necessary to determine both fair value and fair return. Fortunately the Supreme Court[1] has explicitly stated that the factors to be considered in determining fair value are:

(a) Original cost.
(b) Amount expended in permanent improvements.
(c) The amount and market value of stock and bonds.
(d) Replacement cost.
(e) Probable earning capacity.
(f) Operating expenses.

Of all the elements set forth above to be considered in determining fair value, replacement cost is becoming the most controlling and important. It is obtained through a valuation of the property, which can only be made with creditable fairness by the exercise of wide experience, good judgment, honesty and fairness on the part of the individual making up the appraisal.

By giving due weight to the relative accuracy and importance of each of these elements of value, the true or fair value is determined. When this is fixed, the fair return to be allowed is established by a consideration of local condition, risks of the particular business in question and other attending circumstances. From a knowledge of the fair value of, and return on, the property under consideration and from a knowledge of income, it is possible to fix a rate which is proper and fair to charge for the service rendered.

Good Will.—A monopoly, as is generally admitted, has no good will which can be evaluated, and the courts have sustained this view. Good will can only result where competition exists and the tendency of the times is to make no allowance for this element in a public utility valuation; it being considered that good will belongs rather to industrial enterprises where its value is determined by the profitableness of the business; namely, capitalizing the net income. Good will has no value which must be considered in dealing with the subject of Depreciation.

[1] Covington and Lexington Turnpike *vs.* Sanford, 164 U. S., 578.

Franchises.—As the term indicates, it is the right to "do business." Formerly franchises were considered more or less valuable assets and in some instances, have been recognized and allowed for by the courts; but the present tendency, largely by reason of legislative enactments, is to prohibit the capitalization of franchises beyond the absolute expenditures made in good faith in obtaining said franchises. Depreciation or amortization of franchises depends on their terms and has no relation to deterioration of the physical property although the expiration of a franchise might easily reduce service value.

Depreciation.—Webster defines "depreciation" as the "act or state of lessening the worth of." The Century Dictionary says it is "a fall in value; reduction of worth." In appraisal work it means a reduction in utility, expressed in dollars, due to any deterioration in physical plant by reason of

(a) Wear and tear.
(b) Age or physical decay.
(c) Inadequacy.
(d) Obsolescence.
(e) Deferred maintenance.

The term "Amortization" has been used somewhat indiscriminately for depreciation, but it may more properly be applied only to the laying aside of funds at a uniform rate for the writing off of intangible values or the ultimate replacement of capital investment; and in this sense alone, will be used by the author.

The term depreciation, always used in connection with a reduction of value, has, however, three distinct and separate shades of meaning so that the term must be qualified when used to distinguish which one of the following meanings is intended:

First.—The annual amount expressed, as a percentage or in dollars, that should be laid aside to renew or replace the article in question at the time of its abandonment. In this use of the term, the loss of worth, which can be made good or replaced through ordinary maintenance or repairs, is not included as a part of depreciation, but is provided as a part of the regular operating expenses. This, until comparatively recently, was the more common use of the term depreciation which was applied particularly to renewals and replacements. Used in this sense,

the term "depreciation" is somewhat academic and theoretical, and may or may not represent any actual financial outlay.

"Depreciation does not represent actual expenditure but the amount properly reserved to offset the loss in value occurring to the operating plant."[1]

Second.—The annual amount expressed, as a percentage or in dollars, that should be laid aside to renew or replace the article in question at the time of its abandonment, plus the annual expense of maintenance and repair expended in removing such part of depreciation as is practicable and good economy. This then includes all classes of "lessening of worth" and is the application of the term preferred by the writer and used by the New York Public Service Commissions in their rules for uniform accounting:

"The next important step to be taken by the corporation is to determine what amount should be set aside month by month to cover wear and tear, obsolescence and inadequacy—repairs, renewals, replacements and other depreciation."[2]

Such use of depreciation covers all classes or causes of deterioration, regardless of the source or method of worth reduction or by what means it may or may not be removed.

Third.—The total amount—it may be the sum of several years of depreciation—expressed in a percentage or in dollars, that must be deducted from the "original cost" or the "cost to reproduce new" in order to obtain the present value. The determination of the amount of depreciation at a given time, in connection with the valuation of a property, is merely the summation of the annual accrued amounts of deterioration, which, from the time of installation, have been continuously reducing the worth of the property, less such value as has been restored by expenditures for wear and tear, replacements and renewals.

Classes of Depreciation.—The subject of Depreciation from an engineering—not an accountant's standpoint—practically divides itself into several classes, as follows:

[1] Cunningham *vs.* Chippewa Falls Water Works and Lighting Company Railroad Commission of Wisconsin.

[2] Report of the Commission adopted December 8, 1908, in the matter of "Uniform Systems of Accounts for Public Service Corporations."

(*a*) *Wear and Tear, or Maintenance.*—This includes such depreciation as may ordinarily be removed or offset by proper expenditures at such time as the worn out parts may be economically replaced. Few parts of physical property in use ever become completely worn out; after a certain amount of wear, a point is reached at which good engineering requires their replacement; they may be still further used, but only at the cost of economy or safety. With different pieces of apparatus, depreciation due to wear and tear varies widely. It may amount to a small percentage of the whole, as for example the bearings in a generator; or it may amount to a very large percentage, as for example the blading of a steam turbine or the insulation of a high-tension leaded cable. This class of depreciation may be considered to include that due to accidents, such as would result from lightning, fire, or other sudden damage.

Even before the moment original construction is complete, deterioration begins and a more or less depreciated condition of the installation as a whole always exists, which condition will increase until good engineering indicates that the time has come to offset wear and tear by repair. Such depreciation, as related to service value, not always as to sales value, can usually be completely compensated for by expenditures, small, relatively to the value of the entire property. It has been the almost universal custom to include the expense of removing wear and tear, the most obvious class of depreciation, as part of regular operating expense.

(*b*) *Age, Physical Decay or Decrepitude.*—Depreciation of this sort is due to the aging of apparatus that usually has a life extending over a period of years. Property that is short-lived usually passes away through "wear and tear." In many instances, age depreciation will be the same whether the apparatus is used or unused; *i.e.*, a boiler or an insulated wire will deteriorate through the action of the elements practically as rapidly when standing idle as when in continued service. After a given number of years, the expense of maintenance on very many pieces of property will become so large that it is more economical to abandon than replace them. For example, car bodies will in the course of time become so racked that they must be abandoned because the new cost less than repairing the old.

(*c*) *Inadequacy or Supersession.*—This class of depreciation arises from increased demands of service so as to render the prop-

erty in use inconvenient or uneconomical for continuance of operation, although in every way capable of performing the service for which it was installed. For example, when street railway service has increased to such an extent that many and frequent small single-truck cars are required to do the work that can be done by larger double-truck cars at less cost and with less interference with street traffic, both economy and necessity compel superseding the smaller equipment with the larger, and thus through inadequacy, investment in the smaller equipment is depreciated before the property is worn out or becomes decrepit. Furthermore, the introduction of heavier cars may make inadequate the rails and car barns. Inadequacy may and does take place without regard to the length of time the property has been in use or to the amount of service rendered. Inadequacy, although confused by some authorities with obsolescence, is generally distinct from the latter and usually arises from a different cause, although in some cases related to and scarcely distinguishable from obsolescence.

Obsolescence.—Obsolescence means the depreciation of property through the development of something newer and either more economical or more of a fad. Like inadequacy, it may necessitate the abandonment of property long before it is worn out and in many cases, arises largely from demands of the public. What is obsolete in one place may not be effected by obsolescence in another. Note, for example, the recent introduction of P. A. Y. E. cars in the larger cities or the use of open-bench cars in the Borough of Bronx, where they are considered good practice, while at the same time they are by many considered obsolete for the Borough of Manhattan, all within New York City. The substitution of underground conduits and cables for aerial construction required by public authorities is another illustration of this class of depreciation which cannot be prevented by maintenance or offset by repairs; it can only be met by complete replacement. By reason of rapid advance and development in the art, obsolescence has heretofore probably caused the greatest expenditure for depreciation account, unless it is wear and tear; but as time goes on, obsolescence may become a less important factor, though it would probably be at the cost of rapid improvement and development.

"There is also the question of obsolescence, or such changes as become necessary because of new inventions or because of changes in the art.

In the electrical field in particular, such changes are very frequent. They often make it necessary to discard machinery and other equipment of various kinds long before they are worn out. This is an expense that is of the same nature as depreciation and is usually classed as such. It should be charged to operating expenses the same as other depreciation."[1]

(*d*) *Deferred Maintenance.*—The several classes of depreciation hereinbefore referred to assume that the property will be kept in good operating condition and efficiency. If the condition of the property is permitted to lapse beyond that of safety or economy in operation there results a condition due to neglect of proper maintenance and regular repairs, a condition known as "Deferred Maintenance," which is measured by the expenditure that may be necessary to offset such neglect and restore the property to good operating condition. Deferred maintenance is only another term for neglect and always reflects to the discredit of the management or the financial ability of a corporation.

Going Value.—"Going Value," "Going Concern Value," and "Going Concern" are several terms that have been used to refer to an intangible value beyond that of the physical plant attaching to live, active and operating property. The value in question is generally held to relate to and is evaluated from a consideration of earnings. It has been defined as "the cost of acquiring a given income," also as "the present worth of the amount by which the anticipated profits of a going plant, operating at reasonable rates, exceed the present worth of the anticipated profits of a similar hypothical starting plant, operating at those same rates." There is no element included in the total valuation of utility property concerning which there is greater difference of opinion or more controversy and indefiniteness with regard to methods of its evaluation.

The Wisconsin Commission, as well as some of the highest courts have clearly and definitely recognized the value attaching to the building up of an income producing business and allowed such value as a part of capitalization. To determine the worth of a going business in dollars, the Wisconsin Commission has repeatedly estimated, in connection with the par-

[1] Decision of the Railroad Commission of Wisconsin, June 2, 1908, City of Dodgeville *vs.* Dodgeville Electric Light and Power Company.

ticular property under consideration, the necessary expenditure since the business was started, made in carrying the organization to the present state of income, allowing a fair rate of return, necessary depreciation, operating expenses, etc., and compared such estimate with the actual record made by the Company, including all surplus earnings, whether paid out as dividends or not, and by such comparison determined whether or not there remains an excess in the estimated result as compared with the actual result, if so, that difference is considered proper for capitalization as "going value." This theory being based upon cost in the past, cannot in strict logic be used in connection with values which may be made up to represent the cost of reproduction, yet the Wisconsin Commission has so combined the actual cost with estimated cost of reproduction as apparently the only practicable method of deriving fair value.

Judge Lurton in the decision of the Supreme Court in the Omaha Water Works' case, decided May 31, 1910, says:

"The option to purchase excluded any value on account of unexpired franchise, but it did not limit the value to the bare bones of the plant, its physical properties, such as its lands, its machinery, its water-pipes or settling reservoirs, nor to what it would take to reproduce each of its physical features. The value, in equity and justice, must include whatever is contributed by the fact of the connection of the items making a complete and operating plant.

"The difference between a dead plant and a live one is a real value, and is independent of any franchise to go on, or any mere good will as between such a plant and its customers. That kind of good will as suggested in Wilcox *vs.* Consolidated Gas Company (212 U. S., 19), is of little or no commercial value when the business is, as here, a natural monopoly, with which the customer must deal, whether he will or not. That there is a difference between even the cost of duplication, less depreciation, of the elements making up the water company plant and the commercial value of the business as a going concern is evident. Such an allowance was upheld in National Water Works Company *vs.* Kansas City (62 Fed. 853) where the opinion was by Mr. Justice Brewer. We can add nothing to the reasoning of the learned Justice, and shall not try to. That case has been approved and followed in Gloucester Water Supply Company *vs.* Gloucester (179 Mass., 365, and 60 N. E., 977) and Norwich Gas and Electric Company *vs.* Norwich (76 Conn. 565). No such question was considered in Knoxville Water Company (212 U. S., 1) or in Wilcox *vs.* Consolidated Gas Company (212 U. S., 19). Both

cases were rate cases and did not concern the ascertainment of value under contracts of sale."[1]

Public Utility.—Corporations are of two quite distinct classes, those engaged in industrial enterprises more or less private and competitive and those operating as public or quasi public service organizations, known as utility corporations, and monopolist in fact or tendency. All corporations are created in accordance with laws, more or less restrictive, for certain specific objects set forth in their charters or articles of incorporation, but utility corporations have certain rights or franchises accorded them which do not belong to other corporations such as authority to occupy public streets or other public property, the right of eminent domain, *i.e.*, to take private property for their own use in consideration of the payment of an equitable price for the property taken, the duty of obligation to extend and continue service even though such extension and continuance is not desired,[2] with other conditions. The objective, in the creation of all corporations is financial gain, which has heretofore been generally permitted, without other limitation than competition, but latterly the utilities have tended to become monopolies through buying or crushing competitors and as a result there has developed the theory that such corporations, accorded practically the exclusive business of serving the public, if allowed a fair return on the value of their property are entitled to nothing further than that fair return.

In order to carry out this program of limiting earnings to a fair return on the fair value of the property, it has been necessary to ascertain the fair value of various utility properties resulting in one of the causes of the very general demand for appraisals and valuations.

It will be recognized that the operation of a utility under the "fair return" theory entitles it

(a) To earn a reasonable profit on the total fair value, tangible and intangible, of its property, over and beyond the proper expenses of operation including taxes and the various classes of depreciation.

(b) To render good service to the public at the minimum rate which will insure, under good management, earning the air return on the fair value of the property.

[1] Omaha *vs.* Omaha Water Co., 218 U. S., 180.

[2] Weatherly *vs.* Capital City Water Co., Ala. 22 So. 140.

"Summarized, these elemental principles are, the right of the company to derive a fair income based upon the fair value of the property at the time it is being used for the public, taking into account the cost of maintenance and depreciation and the current operating expenses, and the right of the public to demand that the rates shall be no higher than the services are worth to them, not in the aggregate, but as individuals."[1]

The primary reason for prohibiting an unlimited rate of return and allowing merely a fair rate considering local conditions and exigencies, results from the fact that a corporation which is a monopoly is in a position to raise rates arbitrarily and thus earn excessive and unfair profits while an industrial corporation ordinarily is precluded from unfair profits through the workings of competition. Moreover the public, being compelled to purchase from a monopoly, insures its earnings with consequent decrease in risk to the success of the corporation.

Averages.—The term "average" is often used by engineers in connection with life, quantities and prices of physical property, in the high sounding but loose way the term "fair" is used by the legal fraternity in connection with rates and values.

If based on proper premises and not used to conceal omission in working out laborious details, average figures may be most useful and instructive. Frequently, however, the average figures so called are merely guesses or perhaps estimates and not the result of averaging anything but opinion.

The mere averaging of simple figures, as for example, the lengths of several pieces of timber is a simple and generally understood process of arithmetic and division, but obtaining the true or "weighted" average of complex quantities is much more of a problem and the source of frequent error on the part of those not fully understanding the matter. Obtaining the weighted average in relation to values is particularly important, when figuring the life of property which one may be desirous of valuing or depreciating.

Suppose it is desired to ascertain the average life of a number of different buildings, one a temporary structure, another a wood building, the third of brick and a fourth of monolithic concrete. Assuming that for the buildings named the estimated useful lives will be respectively 5 years, 20 years, 50 years and 100 years, what will be the average life of the buildings with

[1] Maine Supreme Court, 1893.

respect to their values if the first cost $5,000, the second $10,000, the third $20,000 and the fourth $25,000. Many people would erroneously figure the average life, by the following method, to be 43.75 years.

Type	Estimated life
Temporary building,	5 years.
Wood building,	20 years.
Brick building,	50 years.
Concrete building,	100 years.
	175 years.

$$\frac{175}{4} = 43.75 \text{ years.}$$

Other persons more experienced with figures would take into consideration the values as follows:

Type	Estimated life	Cost
Temporary building,	5 years time	$5000 = $25,000
Wood building,	20 years time	$10000 = $200,000
Brick building,	50 years time	$20000 = $1,000,000
Concrete building,	100 years time	$25000 = $2,500,000
		$60000 = $3,725,000

$$\frac{3,725,000}{60,000} = 62.08 \text{ years.}$$

But to obtain the true or weighted average life there must be taken into consideration the total dollar value involved in the maximum life period, as follows:

Type	Estimated life	Cost
Temporary building,	5 years	$5000
Wood building,	20 years	$10000
Brick building,	50 years	$20000
Concrete building,	100 years	$25000

No. renewals in 100 years	Estimated cost for 100 years	Dollar years
20	$100,000	$500,000
5	50,000	1,000,000
2	40,000	2,000,000
1	25,000	2,500,000
	$215,000	$6,000,000

$$\frac{\$6,000,000}{215,000} = 27.9 \text{ years.}$$

The above correct average life may also be derived as follows:

$5000 divided by 5	years =	$1000 per year
10000 divided by 20	years =	500 per year
20000 divided by 50	years =	400 per year
25000 divided by 100	years =	250 per year
$60000		2150 = 27.9 years

which is the average estimated life of the property as a whole, based on assumed lives of the several buildings as indicated.

CHAPTER III

PUBLIC SERVICE COMMISSIONS

Utility Commissions.—In a broad sense the term Commission has come to include Federal, State and Municipal Committees or Boards having supervision of so-called Public Utility Corporations, such as railroad, gas, electric-light, street-railway, water-power, water-works, express, telephone, telegraph and even pipe-line, wharfage or compress companies. Although few important valuations have yet been made by Municipal and none by Federal Commissions, much of the appraisal work that has been done by the State Commissions is of such high quality, although wrought out, in many instances, under disadvantageous circumstances, that it should receive due credit and recognition. The opinions, in most cases, show such thought and painstaking effort; the conclusions are usually so logical and the decisions based on valuations have been so frequently accepted as to give them a status comparable to those of a Court of Justice, that some knowledge of the procedure and appraisal work of Public Service Commissions is essential to a broad study of the subject of valuations.

Control of corporations was for many years unsuccessfully attempted through direct legislative enactment. Such methods alone are not sufficiently precise or adequate to cope with the complicated, constantly shifting and rapidly developing conditions of the social, political and economic life of the American people. More recently, control of public utility corporations has been especially undertaken through National or State Commissions, usually clothed with radical authority. The success attending this method of regulation, where attempted, has been so marked that it has now become generally recognized as the most effective means yet devised for corporation control. The experiment was first tried by the State of Massachusetts, which created a Board of Railway Commissioners as far back as the early sixties. In 1885 a Gas and Electric Light Commission was created and given jurisdiction over Gas and Electric Companies, but the Telegraph and Telephone Companies are controlled by a Board of Highway Commissioners. The Massa-

chusetts Commissions have interested themselves particularly in matters relating to the incorporation capitalization and issuance of securities of Massachusetts Companies the quality of service rendered and have done little with regard to making appraisals of property.

Other states soon followed the lead taken by Massachusetts.

Minnesota in 1899 created a Railroad and Warehouse Commission, which was given supervision over Express Companies, Grain Elevator and Commission Houses, but not over Electric Light, Street Railway, Telephone or Power Companies. The investigation of express rates by the Minnesota Commission is said to have cost some $30,000 and is without question the most exhaustive investigation, with regard to Express Companies, ever made in this country. The Railway valuation by the Minnesota Commission, made for rate making purposes, took three years to complete, and established a precedent in this class of works.

Texas in 1891 appointed its Railroad Commission for the purpose of ascertaining

"as early as practicable the amount of money expended to procure rights of way and the amount of money it would require to re-construct the railroad bed, track and depots and transportation and to replace all the physical property belonging to the railroads."

This Commission has already appraised over 93 per cent. of the main trackage of the State.

New York comparatively early established its Railroad Commission and in 1905 a commission controlling the Gas and Electric Corporations but in 1907 both Commissions were replaced by two Public Service Commissions, having control of railroads, gas and electric utilities but not water companies. One commission has supervision over Corporations within the City of greater New York and the other over the balance of the State, including Telephone corporations within New York City. During the year just closed the commission of the Second District, authorized securities for the corporations under its jurisdiction amounting to $162,581,718.52, as follows: Steam railroads, $119,718,937.52; electric railways, $24,323,500; gas and electric corporations, $17,952.581; telephone companies, $581,700. The total amount authorized during the four and one-half years of the Commission's existence is $566,469,507.86.

The Commission of the First District for the year 1911 received reports from 153 utility companies. Some $79,944,177 worth of securities were passed on for approval, but the Commission only allowed $20,548,819. The more important work of the Commission at present is in connection with Street Railway, Elevated and Subway transportation, the Commission laying out routes and awarding contracts for Municipal Subway construction to the amount of $29,000,000 during the year 1911. The passengers carried on the surface, elevated and subway lines aggregated 1,603,908,253 affording a revenue of $83,751,414 for the year 1911.

Wisconsin started with a Railroad Commission, later placing the control of Express Companies under the Commission in 1905, and two years afterward including Gas, Electric, Heating, Water, Telegraph, Telephone, Street and Interurban Railways, and more recently Water Power Companies. The law makes no distinction between privately and municipally owned utilities, demanding the same methods of accounting from and applying the same regulations to both. The Commission began its original valuation of the steam railroads of the State in 1903, which was soon thereafter completed. In 1909 it made a revaluation of the railroads which showed a considerable increase compared with the one made six years previously. Appraisals of other utilities are constantly being made, as the commission makes it a rule to ascertain the value of corporation property before fixing rates. The work of the Wisconsin Commission is pre-eminent. The Commissioners have been men of standing, integrity and industry and their decisions give evidence of painstaking effort and much originality. As indicating the care with which they handle their work it may be stated that out of a thousand utilities in the State, the Commission has appraised less than one hundred to date, although that means a very much larger proportion of the total investment in corporation property than the relative figures indicate.

In 1905 the State of Washington created a Railway Commission, later enlarging it to a Public Commission having jurisdiction over practically all utilities including Warehouse Companies but excepting municipally owned plants. The railway Commission has made appraisals of the larger proportion of the Railways in that State.

Oregon started with a Railway Commission in 1907 and

endeavored to create a Public Service Commission in 1911, but the matter has been held awaiting a vote of the people next autumn.

Nebraska created a Railway Commission in 1906, having jurisdiction over Telephone and Telegraph Companies in addition to the Railroads, Steam, Interurban and Street as well as Irrigation Companies. Agitation over a Commission having control of all utilities has begun.

The Railway Commission of Georgia was created in 1879 and in 1907 was given jurisdiction over Express Companies, Gas and Electric Light, Power, Cotton Compress, Dock, Telephone and Telegraph Companies. The Commission has interested itself more particularly in regard to rates and stock and bond issues, than in appraisals and valuations.

Maryland created a full fledged Public Service Commission in 1910, having oversight of 280 corporations to which during the past year it authorized the issuance of $48,000,000 of securities. The Commission is now actively engaged in physical appraisals and rate questions.

Oklahoma has a Commission created in 1907, having jurisdiction over railways and other utilities including Express, Oil Pipe and Water Companies. This Commission is not as liberally provided with powers as the Commissions of most other States and has petitioned the legislature for larger authority.

California has recently passed a public utility law becoming effective in March giving its State Railroad Commission control of all service corporations and it is expected, with the broad powers accorded, the Commission will undertake work on a broad scale.

For some years the State of Connecticut has had a Railroad Commission and in 1911 the legislature created a new Commission to have charge of all Public utilities, thus superseding the Railroad Commission. The Governor appointed to the new Commission the members of the old Commission so that its methods and personnel are practically continuous.

Vermont, Colorado, Florida, Georgia, Iowa, Illinois, Indiana, Maine, Pennsylvania, Missouri, South Carolina and Rhode Island have each had a Railroad Commission for some years but their work is largely routine.

In 1909 Arizona, and during the year 1911 the states of Ohio, Kansas, Maryland, New Hampshire, Nevada and New Jersey

created Commissions to control and regulate public utilities on principles similar to those embodied in the laws of the states of New York and Wisconsin. The penalties provided for a violation of the Kansas law, which in some instances becomes a felony, are exceptionally rigorous. At present in almost every state where Commissions are not already in existence the legislatures have been or are considering the question of creating some sort of Public Utility Commission.

Reasons for the Creation of Commissions.—For many years competition has been held to be the proper means for regulating rates; believers in the Sherman Act and its enforcement still cling to that theory, but the extravagant waste and loss involved in acceptance of this policy, as applied to public utilities at least, has, as a general rule, always resulted in an increased cost to the consumer. Regulation of rates by governmental authority, is of course incompatible with free competition. It would seem to be self-evident that the theory on which regulation is based can only be sustained by the recognition of a monopoly. Whatever may be said against governmental regulation of private industrial corporations, which are perhaps automatically controlled through competition, does not apply to what are termed Public Utility Corporations, which are, or properly may be, monopolies.

The necessity for regulation by the public arises, in the first place, because the exercise of franchise rights by certain corporations, while academically not exclusive, is nevertheless practically non-competitive; therefore, one of the ordinary checks arising through competition does not in such cases apply. Unlike the individual or ordinary business corporation, a public utility corporation frequently cannot begin business without being organized under special and specific laws. Such corporations may be granted unusual franchises; for example, the right of eminent domain, and are recognized as existing for service to the public in a manner, and with privileges entirely unique and distinct from those of ordinary business undertakings, and are therefore acknowledgedly subject to special regulation and control. Even ordinary business corporations which have no special privileges granted, if uncontrolled, may, as the result of unusual commercial acumen linked with a large aggregation of capital—illustrated for example, in the case of the so-called "trusts"—create a wrong which organized society will very properly step in and limit, control, or prohibit. Business trusts

are in effect monopolies, because competition as a practical matter is out of the question, and hence regulation in their cases is also essentially necessary. The underlying principle of monopolies, coöperation, is a legitimate product of our present civilization; it may be controlled but should not be prohibited.

In the second place, regulation of utility coöperations competing for the same business is required from the very nature of the business itself. If they are allowed to compete fully and freely, experience indicates that they will ultimately engage in a war of annihilation, the expense of which is in the end borne by the security holder or the public. Up to a few years ago, political economists believed and argued that the only regulation required for all commercial operations was free and unrestricted competition:

"Because the experience of mankind had not developed essential monopolies, and it was believed that every problem which would arise would be solved by giving full play to the spirit of competition. * * *

"Whether that system of dealing with railroad corporations will succeed or not can be ascertained by viewing their history in the State of New York, and the experience which was had in this State demonstrated that it did not work to the advantage of the public and that the evils connected with the system were simply enormous and unendurable. Competition could not exist upon railroads."[1]

The principle of State or Federal control and regulation of corporations is not new, although the application of this principle has recently been greatly broadened. Liberty has so largely grown to mean unrestricted license the recent statement of the old fact that the Public can demand and take from the individual, and even more from the corporation, anything "from his pocketbook to his life inclusive" was as startling as true. The only precedent to the taking is the public necessity with the proper method of remuneration. In theory then, regulation is correct if only the application is practicable and fair.

Control of monopolies must therefore be regulated by the legislature, but as is generally recognized, the legislature has no authority to delegate this right, which includes both judicial and legislative functions, to an administrative board; practically, however, it is possible for a legislature to effect regulation

[1] F. W. Stevens, address A. I. E. E. dinner, 1908.

through a committee or commission by defining the powers and determining the policy of its committee or commission. The result is in effect that the commission ascertains the facts and conditions in each case and administers the law as laid down by the legislature, therefore its function is neither judicial nor legislative.

The relative function of the Commission in its relation to the legislature has been established by the Supreme Court of Wisconsin.

"The division of the governmental powers into executive, legislative and judicial, while of great importance in the creation or organization of a State, and from the viewpoint of institutional law and otherwise, is not an exact classification. No such exact delimitation of governmental powers is possible. In the process of enacting a law there is frequently necessary the preliminary determination of a fact or group of facts by the legislature, and it is well settled that the legislature may declare the general rule of law to be in force and take effect upon the subsequent establishment of the facts necessary to make it operative or to call for its application. * * * The legislature may delegate any power, not legislative, which it may itself rightfully exercise. This power to ascertain facts is such a power as may be delegated. * * * This law establishes, and thenceforth assumes, the existence of rates, charges, classifications and services, discoverable by investigation but undisclosed, which are exactly reasonable and just. It commits to the Railroad Commission the duty to ascertain and disclose that particular rate, charge, classification or service. The law intends that there is only one rate charge or service that is reasonable and just. When the order of the commission is set aside by the court, it is because this reasonable and just rate, charge, classification or service has not yet been correctly ascertained. When the order of the commission has been rescinded or changed by the commission because of changed conditions it is because there is a new reasonable rate to be ascertained and disclosed applicable to such new conditions and fixed by force of law immediately when the new conditions came into existence. But the theory and the mandate of the law is that this point is always discoverable although not always discovered. Until it is discovered and made known the former rates and service prevail. The order of the commission is prima facie evidence that the rate, charge or service found and fixed by it is the particular rate, charge or service declared by the legislature in general terms to be lawful and to be in force. If it were conceded that the commission had power or discretion to fix one of several rates, either of which would be just and reasonable, it would be hard to say that this was not a delegation of pure legislative power to the commission. But the theory of

this law is to delegate to the commission the power to ascertain facts and to make mere administrative regulations.

* * * * * * *

"The notion that commissions of this kind should be closely restricted by the courts, and that justice in our day can be had only in courts, is not conducive to the best results. Justice dwells with us as with the fathers; it is not exclusively the attribute of any office or class, it responds more rapidly to confidence than to criticism, and there is no reason why the members of the great Railroad Commission of this State should not develop and establish a system of rules and precedents as wise and beneficent within their sphere of action as those established by the early common-law judges. We find the statute well framed to bring this about."[1]

The argument has been made that corporation control and limitation of earnings by Public Service Commissions will remove all incentive for development, originality, economy or improvement, that when a corporation has reached the maximum rate of return allowed there no longer remains any reason or ambition for increasing earnings.

That a just return on the value of the investment or property is not alone the basis to be considered in fixing the proper rates or allowable earnings of a corporation is indicated by published statements and decisions of more than one Commission.

Not only the propriety, but the necessity, of permitting compensation for good service and efficient management has been stated by the Public Service Commission of New York, First District, in its discussion of "Uniform Systems of Accounts."

"It is not the purpose of public regulation by reducing rates to take from a corporation all the proceeds of enterprise and thrift that it may earn beyond a reasonable dividend. If a thrifty and intelligent corporation can, at a smaller expense to itself, supply a public service, than a careless and incompetent corporation, the former should not be compelled to charge the public less than the latter. To do so is to discourage progress and economy."

Despite this fair statement of intention an examination of the rulings of state commissions shows a tendency to place all corporations on the same footing as regards the returns to investors; that is, regardless of whether capital has been invested and conserved in a judicious and intelligent manner or in an

[1] Minneapolis, St. Paul & Sault Ste. Marie Ry. Co. *vs.* Railroad Commission of Wisconsin 136, Wisconsin, 146.

inefficient way, the precedents established indicate that about the same profit will be allowed in either case. Such procedure, of course, does away with all incentive to improve the earnings by cutting down operating expenses, or to decrease the price, or introduce new apparatus or modern methods. It removes the stimulus heretofore existing with the individual, to make the very best showing possible, and hence is a reasonable, valid, and practical objection to control by Commissions. One method of offsetting this very decided disadvantage has been evolved by the application of the London sliding scale, so-called because originating in London, England, and now in use in a number of places, particularly in Boston, Mass. The principle is a profit-sharing one, in which the investors are entitled to a definite rate on their investment with a fixed price for their product to the consumer. Every decrease in price, as for example 5 cents per unit in the case of gas at Boston, entitles the investors to an increase of 1 per cent. in their rate of dividend. An objection to this plan is that while it may be perfectly fair for a term of years, improvements in methods of manufacturing may so largely reduce the manufacturing costs as to entitle the investors to abnormally large dividends, at which time a readjustment of the base for price of product and rate of dividend would result in seriously depreciating the securities held by the owner at the time of such adjustment. This London scale, however, is at present the best practical method evolved for automatically adjusting prices and profits as between the public and the corporation.

Admitting that Commissions are in existence, that they are likely to remain and exercise supervision of public utilities it is apparent that they will require and insist upon appraisals of corporate utility property, perhaps both tangible and intangible, certainly the tangible, when there are involved questions which effect rates, also usually when considering questions of sale or capitalization and sometimes even in tax cases.

Results Accomplished by Commissions.—Individuals interested in corporations in many instances presuppose that regulation by Public Utility Commissions means unfair rulings against the corporations and espousal of the cause of the people. In case Public Service Commissions should degenerate into mere machines for use by the demagogue or politician, such results may be feared, but so many of the State Commissions are constituted of

honorable men whose intentions and integrity are of the highest, whatever may be said of their lack of knowledge or experience, that actually there is little cause to complain that the corporations alone are receiving unfair treatment. Mistakes have been made and improper decisions have been rendered, but these are impartially distributed as between the corporations and the public. The Commissions in existence show by their record that on the whole both the corporations and the public may expect impartial treatment.

The corporations usually desire to operate as a monopoly, and the creation of Commissions is now predicated on the assumption that a monopoly will be recognized and allowed under proper regulation and control.

The attitude of the Public Service Commissions with regard to the avoidance of competition and the recognition of a controlled monopoly, has been repeatedly affirmed notably in the decision of the Public Service Commission of New York, First District in the Long Acre case[1] and of the Second District in the case of the Binghampton Light, Heat & Power Company, where that Commission said:

> "A Public Service Corporation is in its nature an essential monopoly." * * * "A monopoly by the very fact of being a monopoly gets all the business there is." * * * "With a monopoly, if the density of the business gives extravagant profits, it is the duty of the state to cut down the price so that the monopoly obtains only reasonable returns. The evil of the monopolies is that uncontrolled they can charge prices which will give excessive and unreasonable profits."[2]

This properly means that while on the one hand adequate service will be required and a limit to returns on property will be fixed by the investment, value and proportionate risk of the business, on the other hand property rights will be protected and conserved, competition and waste eliminated and a fair return allowed.

Corporations that have been found lax on mismanaged as to the upkeep of their physical property, that were employing improper accounting methods resulting in the impairment of property or capitalization have been compelled to correct their

[1] Long Acre Electric Light and Power Co. Order 607. Report, 1908, Vol. II, p. 139. Public Service Commission of New York, First District.

[2] Application of Binghamton Light, Heat & Power Co. Decision Aug. 4, 1909. Public Service Commission of New York, Second District.

methods. The increased stability of public utility securities due to their issuance under regulation has caused their acceptance by fiduciary corporations in a way that was impossible before regulation was undertaken. The methods of accounting and publicity insisted upon by Commissions result in a systematization and classification of corporation expenditure, which afford as never before, a knowledge of and confidence in costs not heretofore possible to either the public or the corporations. Abnormal and unfair bond issues have been prevented, increased comfort and safety in operation both to the public and employees have been secured, maintenance of equipment and provision for depreciation funds have been insisted upon, while extortionate rates on the one hand and a fair return to the investor on the other hand, even through an increase of rates, have been insured where the properties can be made to produce such results.

Some of the universally acknowledged beneficial results of the appointment of State Commissions has been the retirement of Public Service Corporations from interest in and control of politics, and the abandonment of differential rates, discrimination and rebates to favored customers. Prof. H. B. Mayer, member of the Interstate Commerce Commission and formerly Chairman of the Wisconsin Commission, says of this matter

"The whole State of Wisconsin was streaked and plastered with discrimination in the rate utilities"

and it has been estimated that this favoritism cost the Wisconsin Companies some $2,000,000 annually. In New York State the railway and lighting companies, which were accustomed to contribute liberally to campaign funds, have practically discontinued doing so since the commissions were appointed, resulting in a purification of public affairs, regarding which there is no question.

The Governor of Wisconsin in a recent statement said:

"As evidence of prosperity under commission regulation the last annual report of the Wisconsin Commission shows that during the year the operating revenues of electric utilities increased 20 per cent., their net income 29 per cent., and new construction for the year 145 per cent. The operating revenues of water utilities meanwhile increased 7 per cent., their income 13 per cent., and new construction 24 per cent. Gas utilities increased their operating revenues 3 per cent., their net income 15 per cent., and new construction 24 per cent. Telephone utilities increased their operating revenue 11 per cent., their net income 9 per cent.,

and construction for the year 14 per cent. Railway and traction lines on the average increased their operating revenues 13 per cent., their net income 8 per cent., and construction an equal amount. All utilities in Wisconsin are in a more flourishing condition now than ever before and are planning to extend their operations far into the future. Taking a longer period, as we may in the case of railway regulation, which was begun earlier, the results are even more striking. For the fiscal year ended June 30, 1905, the total mileage of railroads in Wisconsin was 6931 and the total operating revenue $50,144,702.43. This was the year immediately before commission regulation of railroads began. Five years later, or during the fiscal year ended June 30, 1910, the total mileage had increased to 7209, an increase of 278 miles, and the total operating revenues amounted to $65,055,928.76, an increase of nearly $15,000,000. Thus, notwithstanding the decrease in transportation rates and improvement in service enforced by the Railroad Commission, the operating revenues of the railroads of Wisconsin increased approximately 30 per cent. As an indication of the general prosperity of the State meanwhile it may be worth mentioning that under these new policies the deposits in commercial and savings banks in Wisconsin increased in round numbers during this five years from $187,000,000 to $276,000,000, or 51 per cent."

Progressive and honest corporation management working with a fair and intelligent Commission will accomplish the best things both for the corporation and the public. That this view is being accepted by the corporation men themselves is indicated for example by the following quotation from the last annual report of President Vail to the Stockholders of the American Telephone & Telegraph Company:

"Public control or regulation of Public Service Corporations by permanent commissions has come, and come to stay. State control or regulation should be of such a character as to encourage the highest possible standards in plant, the utmost extension of facilities, rigid economy in operation, rates that will warrant the highest wages for the best service, and such certainty of return on investment as will induce investors not only to retain their securities, but to supply at all times all the capital needed to meet the demands of the public. Such control and regulation can and should stop all abuses of capitalization, of extortion, of overcharge, or of unreasonable division of profits."

The remarkable commentary to be made on the preceding is that the good work being accomplished by Commissions and the justice of their orders and rulings is based on an appraisal of the properties under their supervision, already made or tentatively assumed, which establishes the essential fairness of their decisions.

The National Association of Railway Commissioners believing that the first step to be determined, in fixing the basis upon which a carrier can fairly claim the right to earn, is a "true and reliable valuation of the tangible properties" and in order to ascertain exactly what had been done in the way of physical valuation and taxation of railways by the different states, sent a communication to each, receiving the following interesting replies.[1]

Arkansas.—No valuation undertaken.

Arizona.—Commission just created.

Connecticut.—No physical valuation ever made. The properties are taxed as follows, quoting from letter:

"The value for taxation is ascertained by adding the amount of bonds and floating indebtedness to the market value of the stock. In case of a line running into more than one State, the statutes provide for prorating the value according to mileage; also for deductions of amounts spent for properties wholly within the State."

California.—No valuation undertaken by the commission. Properties are taxed on the ad valorem basis. Values fixed by the State Board of Equalization.

Colorado.—No physical valuation ever made. Properties are taxed on the ad valorem basis as follows: Railroad companies make returns to the state board of equalization, showing—

First.—Stock and bond value of entire road, crediting to Colorado its mileage proportion of main track within the State.

Second.—Capitalization net earnings in Colorado on an 8 per cent. basis.

Third.—The physical value as returned by the corporations themselves. An average of three above values is taken as the basis for taxation.

Florida.—Nothing done by the Commission in the matter of valuing properties.

Georgia.—No physical valuation ever made. The value for taxing purposes is made by the comptroller-general. In case any dispute arises with the railway company as to the value fixed by him, a board of arbitrators is provided for.

Iowa.—Nothing has been undertaken by the commission.

Illinois.—No valuation undertaken by the commission. Properties are taxed on the ad valorem basis, the valuations being fixed by the state board of equalization.

Indiana.—No physical valuation has been undertaken.

Idaho.—Has no commission.

[1] Proceedings of the twenty-first Annual Convention National Association of Railway Commissioners. Nov. 16–19, 1909.

Kansas.—No physical valuation has been undertaken. Properties are taxed on the ad valorem basis by the state tax commission.

Louisiana.—No valuation undertaken.

Maine.—The commission is not charged with the duty of valuing the railroad property.

Michigan.—The state tax commission has made a complete physical valuation for taxation purposes.

Missouri.—No physical valuation ever made. The state board of equalization values the property for taxing purposes by fixing an arbitrary assessment per main-line mileage, terminals valued separately; also fixing a franchise value; quoting from the letter of the commission as follows:

"In short, the railroad property in this State is assessed on its main-line mileage, its terminals, and its franchises, but no rule has been adopted by which the values used are ascertained. Missouri law requires all property to be assessed at its actual cash value, but it has become the practice in this State to assess upon a valuation which shall secure revenue sufficient to supply the needs of each county; hence it is that there is no uniformity in the assessment, each county being assessed as the needs of the county demand."

Montana.—No valuation ever made.

Massachusetts.—The board has not attempted any valuation for rate-making purposes. Properties are taxed upon the ad valorem plan. The information contained in the letter from the tax commissioner throws so much light upon the taxing of railroad property that it is given in full, as follows:

"The theory of the Massachusetts law is that the taxable value of a railroad is properly found by ascertaining what the public will pay for the railroad upon our tax date, namely, May 1. What the public will pay is easily computed by multiplying the number of shares outstanding by the price at which these shares sell on the market on May 1. The result of such a multiplication is a value called in our statute 'the value of the corporate franchises.' We eliminate from this value such part of it as is proportional to the fraction of the mileage of the railroad situated outside of this Commonwealth upon the theory that for the purposes of taxation Massachusetts is not concerned with the value of the railroad not in Massachusetts. From the value remaining after this deduction, we deduct further the value of the real estate and machinery of the railroad taxed by the cities or towns of Massachusetts through which the railroad passes or in which it owns such real estate and machinery. Machinery in this connection is only such fixed machinery as is attached to or erected upon real estate owned by the corporation. Every railroad corporation operating in Massachusetts has been given by the Commonwealth a right of way five rods wide all of the distance

between the terminals. The cities and towns are not allowed to tax the corporation for any real estate or machinery within this right of way. The cities and towns, therefore, tax the corporations only upon such real estate and machinery as is owned by the corporation outside of this right of way. To give a concrete example of the method by which the tax is computed we will assume that a railroad corporation has outstanding upon May 1, 100,000 shares of stock which are selling in the market on that day at $200. The value of the corporation franchise of this railroad is found to be, therefore, $20,000,000. We find that one-fourth of the mileage of the railroad is outside of Massachusetts. Therefore, we eliminate one-fourth of this $20,000,000 and have a resulting value of $15,000,000. The cities and towns of the Commonwealth report to us in the aggregate that they tax the corporation upon real estate and machinery owned by it within their limits of $7,000,000. We subtract this $7,000,000 from the $15,000,000 and have left $8,000,000 as being the value of the corporate excess upon which the Commonwealth assesses a tax at the rate prevailing for the given year. The rate this year is $17.35 per thousand of valuation.

"It thus appears that a railroad corporation pays taxes, first, to the cities and towns in which it owns real estate and fixed machinery, and, second, to the Commonwealth upon whatever other net value (if any) is shown by the selling price of its shares of stock.

"The value of the real estate and machinery of the corporation situated in the cities and towns is determined in every case by the board of assessors elected by and serving each city or town.

'Other than as herein specified there has never been made any determination of the value of the property of railroad corporations in Massachusetts."

Minnesota.—The commission has undertaken to make a physical valuation of all the railway properties. This was completed December 20, 1908. The cost of the work averaged $8.12 per mile of main line roadway. The railway properties are taxed upon the gross earnings basis.

New York.—First district: Confined to New York City and comprises the city railway lines. The public-service commission has undertaken a physical valuation of the above properties. This is now nearly completed. These values are for use in any proper case in which values are one of the factors.

Second district: The commission has as yet not undertaken the work of valuing railroad properties.

New Jersey.—No valuation has been undertaken by the commission. A special commission has been named which is now engaged in valuing the property for taxation purposes.

New Hampshire.—No valuation has been made.

North Dakota.—No valuation undertaken.

Nevada.—No physical valuation has ever been made. The following extract from the letter of the commission indicates how the taxes are levied and affords an example showing the advantage of having a reliable valuation made:

"The taxation of railroads in Nevada is fixed by the State Board of Assessors, composed of the assessors of each county, with the governor presiding, which meets on the second Monday of January each year. At every meeting of the board each railroad is taken up separately and the valuation of the same is fixed at the discretion of the board, the capitalization, bonded indebtedness, cost per mile, and earning power of each road being taken into consideration before an assessment is fixed.

"At the last meeting of the board of assessors, held on the second Monday of January, 1909, the governor called upon the railroad commission for such data as it had concerning the valuation and earning power of all railroads operating in the State. This information was readily furnished by the commission from the annual reports on file, and from testimony submitted by several of the companies in suits that were pending at the time in the United States circuit court, wherein the railroads were attacking the maximum freight rates fixed by the railroad-commission law of 1907. This testimony tended to show the high valuation of railroads in Nevada, for the purpose of rate making and was greatly at variance with the figures submitted by the several companies before the board of assessors for the purpose of assessment.

"As an example of the great disparity between the assessed valuation of railroad property and the value of the same for rate-making purposes we will cite the case of the Central Pacific Railway, leased by the Southern Pacific Company. In the affidavits of Mr. C. B. Seger, the auditor of the Southern Pacific Company, it was testified that the value of the Central Pacific Railway in Nevada was $66,253,187.21, or $146,936.73 per mile of line, while the assessment of this property in 1908 was, on the main line, $17,500 a mile, and on sidetracks, rolling stock, and other property the value was fixed at $6,691.36 a mile, making a total assessment of $24,191.36 a mile as against the value for rate-making purposes of $146,936.73."

Oklahoma.—The commission is now engaged in making physical valuation, expecting to have same completed within two years' time.

Ohio.—No physical valuation has ever been made. Properties are taxed on the ad valorem basis and are valued by boards of county auditors of the counties through which the road runs. These assessments are afterwards passed upon by the state board of equalization. The value as fixed by this board is afterwards apportioned to each county on a mileage prorate.

Oregon.—The commission is now engaged in making a physical valuation of all the railway properties. Properties are taxed on the ad valorem basis, the valuation being fixed by the various county assessors.

Pennsylvania.—No physical valuation ever made. Properties are taxed on the ad valorem basis and are valued by the auditor-general taking the average market value of the stocks and bonds each year.

Rhode Island.—No valuation undertaken by the railroad commissioner. Railroad property is taxed on the ad valorem basis, the values being fixed by each town separately, the various towns taxing the railroad property located within their respective territory.

South Dakota.—The commission is now engaged in making a complete physical valuation of the railroad properties.

South Carolina.—No valuation undertaken by the commission. Properties are taxed on the ad valorem basis. The value is an arbitrary one, being fixed by the comptroller-general, secretary of state, attorney-general, state treasurer, and chairman of the railroad commission.

Texas.—The commission undertakes to value all the physical properties of the railway company and keep the values corrected up to date. These values are made with a view of being used by the commission chiefly for regulating the use of stocks and bonds. The values are available for and are used by the tax commission when undertaking to fix the values for taxing purposes.

Vermont.—No valuation undertaken.

Wisconsin.—No valuation made by the railway commission. Properties are taxed on the ad valorem basis and a complete physical valuation has been made by the tax commission.

Wyoming.—No railway commission.

Washington.—Complete physical valuation has been made by the commission. In this State the commission has gone farther than the authorities in any other State, in that the values after having been completed have been separated, showing the value to be assigned to the state uses and interstate uses when being considered for rate-making purposes.

CHAPTER IV

MAKING AN APPRAISAL

General.—An appraisal of utility property is essentially a piece of engineering work, but it involves qualifications broader than mere construction, more exacting than making ordinary examinations and reports. The object to be attained is a definite, logical one—namely, to ascertain a fair value at a given time, for particular, specific property. Yet the attainment of the object sought, is at best difficult, and usually impossible of exact precision, owing to the fact that no two properties are exactly alike, prices fluctuate, the personal equation varies, property conditions are changing, the workmen are liable to err, self-attainment is ever present, the object sought tends unconsciously to prejudice the expert favorably or unfavorably, and diverse interests bring pressure to bear so that under these various influences the individual honestly endeavoring to obtain a just, final and single figure, will probably find the result differs from that of another expert equally honest and industrious, the difference between them depending on the dissimilarity in methods, effort, experience, prejudice and influence.

From an engineer's standpoint, it would seem as if the making of an appraisal would result in but one set of figures, and that the engineer is not interested in the purpose for which the valuation is undertaken. To a limited extent, this is correct, but as more fully explained in another chapter, value has several modifications of meaning, and the particular value as determined by the purpose of the appraisal, must be clearly understood and appreciated by the individual in charge of making the valuation. There can be but one value, one set of figures truly representing original cost, reproduction cost at a given time, or present worth of property in a given condition, but while there is one set of figures for each value there may be several values.

There should be no confusion of thought or misapprehension as to the fact that there is only one legitimate definite value for property, estimated on a given basis. Original cost for a particular machine will be always the same, but its reproduction value will vary from year to year, depending on the conditions of the

market, in the same way the present value will depend upon whether or not repairs and up-keep have been well maintained or the parts allowed to deteriorate so that deferred maintenance is apparent. Thus it will be seen that while the valuation of property is primarily an engineering calculation, the value finally sought will depend upon the basis of the valuation.

That the particular value, as original cost, replacement cost or present value, which may be sought in any given investigation will not and must not be modified by the purpose for which it may be used or the effect it may produce goes without saying. Perhaps such statement is superfluous, in view of the engineer's code of ethics, but the thought needs emphasis in view of the frequent irreconcilability of engineering figures, and the too prevalent and sarcastic comments on the unreliability of all expert opinions.

The following points have been quite generally accepted as forming the theory or basis on which to proceed in making an appraisal:

(a) Ascertain, and keep clearly in mind the particular value to be determined in order that an intelligent appreciation of the end, and purpose of the appraisal may be fully accomplished. An individual in charge of an appraisal cannot be looked upon as a mere machine, and the weakness of many valuations has been due to the fact that the engineer in charge has been so considered. He has been instructed to ascertain a certain particular fact, one of the several parts going to make up the complete answer, and in consequence, failing, perhaps, to fully understand the entire matter, or precluded from offering suggestions or advice which in many instances would be invaluable, there has resulted an incomplete solution of the problem which always causes dissatisfaction, and sometimes disaster.

(b) Thoroughly appreciate that an appraisal is not made for the purpose of ascertaining a "scrap" or "junk" value of the property unless under exceptional conditions, as more fully explained in the discussion of depreciation. Valuation work is usually for the purpose of ascertaining the worth of property, either in its service to the public or for purposes of sale, or taxation as an operating entity. Therefore the value that physical elements of the property may have, separate and apart from the other elements, or for use in some other place, for a different purpose, is not the usual value desired when making an appraisal.

"The true value of a line of railroad is something more than aggregation of the values of the separate parts of it, operated separately. It is the aggregate of those values plus that arising from a connected operation of the whole, and each part of the road contributes not merely the value arising from its independent operation, but its mileage proportion of that flowing from a continuous and connecting operation of the whole. The value of property results from the use to which it is put, and varies with the profitableness of that use, past, present and prospective, actual and anticipated. There is no pecuniary value outside that which results from such use.

"In the nature of things it is practically impossible, at least in respect to railroad property, to divide its value and determine how much is caused by one use to which it is put and how much by another." [1]

(c) Realize that the final figures obtained as the result of an appraisal should be free of all doubt as to their reliability, in order that their sponser may be able, if necessary, to satisfactorily stand cross-examination in a Court of law. Such figures can only be obtained through the application of methods that are eminently fair, conservative, wrought out with an expenditure of the necessary time, reasonable care and in sufficient detail to insure accuracy and correctness. Aside from experience in engineering work, the knowledge of Court procedure, clear cut conceptions of value, with a high sense of fairness, and integrity will be found helpful in preparing estimates of value.

(d) Understand that throughout the progress of the work, it will be found necessary to exercise tact, judgment, equipoise and patience, aside from having the necessary qualifications in the way of engineering experience, conscientiousness, perseverance, and good common sense, so that the final figures represent the appraiser's honest opinion of the value of the property under local conditions.

In making appraisals there is a constant tendency to confuse original cost with cost to reproduce new, at the time of the appraisal. The extent to which this error exists, even among those supposed to be authorities, is remarkable. For example, in some of the decisions of the New York Public Service Commission First District, the cost to reproduce new or present value of machinery, apparatus and buildings, is used in connection with assessed value, or original cost of real estate, to obtain what is

[1] Cleveland, Cincinnati, Chicago and St. Louis Railway *vs.* Backus 154 U. S., 444.

indicated as reproduction cost. In a similar way, the Wisconsin Railroad Commission ordinarily estimates the deficit from operation or cost of building up the business of a corporation during the early years, which amount it uses, in connection with the appraised value of the physical property on the basis of reproduction cost, in order to obtain the total value of the property in question. As has been suggested elsewhere under "Going Value" such procedure would seem illogical, in that the physical property has been valued on the theory of the cost of reproduction, while the capitalized deficit, or going value, is made up from a consideration of the past history of the company, based on actual costs, where obtainable. Theoretically there is no reason why the cost of building up the present business, like the value of the physical plant, should not be based on an estimated cost of reproduction. Original cost, cost of reproduction new, and present values are not synonymous, and cannot be mingled indiscriminately. All three values are of service in determining the fair value of property, but no single one of these three is the only fair value. The courts have held that while original cost is of use in determining fair value, it is not the only controlling factor; they have indicated that cost of reproduction, at any given time, shall be considered as one of the standards of value, but they have not suggested setting up a standard which is a combination of these two separate and distinct bases of valuation.

Cost of Appraisals.—The expense of making an appraisal will naturally depend on the extent of the property, the thoroughness with which the work is to be done, and to a lesser degree, upon the time allowed, and the grade of men employed on the work.

An appraisal to be used for the purpose of opening new accounts, can be made rather general and, of course, would not be nearly as elaborate and expensive as an appraisal to be submitted to a Public Service Commission, as a basis of fixing rates. Property that represents a considerable investment and is of a uniform type, so that the inventory is brief, and the unit prices few, can be appraised at an expense of not over 20 to 30 cents per thousand dollars, of property valued. On the other hand, where there are many structures of various types, with expensive but unexposed foundations, many and varied elements, making the compilation of the inventory and the determination of the unit prices, an arduous and time-consuming task, the expense of the appraisal work may run up to a dollar or more per thousand

dollars, of property valued from 60 to 75 cents per thousand dollars, is usually considered a very satisfactory cost for the appraisal of large lighting, traction, and similar properties, but considerably lower figures obtain for steam railroad valuation. The figures given, of course, do not include any expenditures for court proceedings, arbitrations, expert testimony, or counsel fees.

The appraisal of the railroads by the Railroad Commission of Texas in 1894 and 1895, covering 8860 miles and appraised at $15,844 per mile, has been estimated to have cost about $2 per mile. In that case, the railroad companies furnished the appraisers with maps, profiles, construction records, estimates of quantities, and such other information as was available, thus saving considerable expense, although inspectors personally examined the property, checking the measurements of structures and estimating quantities. The Minnesota State appraisal of the steam roads cost 8.12 per mile of main line.

The following has been stated with regard to the cost of the valuation of the Michigan Railroads, appraised at an average of $15,290 per mile of single track, exclusive of the non-physical elements, first made in 1900, under the direction of the State Legislature:

"No complete statement of the total cost of the work of valuation in Michigan has ever been issued as a public document. The cost of the work, including salaries of appraiser, engineers, assistants, clerks, all expenses of the Board of Review, all expenses connected with Professor Adams' non-physical appraisal, also all office rent, stationery, supplies, telegraph, telephone, and railroad expenses, printing and binding—in short every dollar chargeable to the Michigan railroad appraisal of 1900—footed up to $70,604.21.

The exact mileage of roads in the State was:

Main track	7,082.35 miles
Second track	164.83 miles
Branches	730.92 miles
Spurs and sidings	2,904.70 miles
Total	10,882.80 miles
Average cost per main-line mile	$9.97
Average cost per total track mile	6.50

"The exact figures of cost of the subsequent work of appraisal, or the costs of the litigation, are not available to the writer. In a general way, it may be said that the cost to the State of the railroad tax cases was not far from $75,000 and that the expenses of the second and third appraisals were less than $50,000, so that, to date, the entire cost

to the State of Michigan is less than $200,000 for the three appraisals and the litigation growing out of them.

"Some information as to details of costs may not be out of place. All employees were paid a salary and required to provide their own subsistence. Salaries ranged from $250 to $500 per month for experienced men, from $125 to $250 for men with only a few years of experience, and from $75 to $125 for assistants and clerks.

"All traveling expenses (except hotel and subsistence) were paid, the State issuing mileage books to all employees, and receiving a complete check on the movements of every man through the mileage bureau. The telegraph and long-distance telephone were used almost exclusively in communication between the office and the men in the field, all bills being paid by the State. All expenses of inspection by hand-car, velocipede-car, etc., were paid by the State, except as the roadmasters made trips with the inspectors.

"The unvarying policy of the appraiser was to reimburse the companies for all extra expenses incurred on account of the work, and to accept no transportation or favors from any company"[1]

Inventory.—Nothing is more important to a trustworthy appraisal than the inventory. In fact the whole valuation falls if the inventory is not complete and accurate. Making a proper and reliable inventory of a large property, involves an amount of detail that will seem unduly laborious with an accompanying unwarranted expense to those inexperienced in appraisal work. Ordinarily it is the difficult and expensive part of the work and will be found to run from 50 to 75 per cent. of the total cost of making an appraisal.

It is very desirable to determine in advance what separation of the values may ultimately be required. It is comparatively easy to arrange the work at the start so that the value of certain parts or classes will be kept separate, and therefore conveniently available at the conclusion of the work, whereas if such classification is not arranged in advance, it will be found that the employees will group items differently, seeking only the final figure, with the result that, if later the value of certain items such as foundations, services, labor of track construction, or excavation for water-mains is sought, a large amount of time, labor and expense which would otherwise have been avoided, will be incurred in going over the detail sheets and picking out the items particularly desired.

[1] The Valuation of Public Service Property, H. E. Riggs. Transactions American Society of Civil Engineers, Vol. LXXII.

In order to determine cost of reproduction at some future date, unit prices proper for that time must be applied and if the inventory is conveniently arranged in advance, much future time and expense can be saved when substituting the new unit prices.

In order to properly make an appraisal of any property, other than the most simple, there will be at once apparent, the necessity of intelligently classifying the various subjects, at least along general lines, as to tangible, intangible and superseded and possibly non-existent property. Then the tangible property must be divided into sub-classes, for example, real estate, buildings, generating-machinery, track, pole lines, ducts, cable, rolling stock, distributing mains, services, paving, tools, supplies, furniture, etc. Where the appraisal covers extensive properties, further sub-division or classification will be found necessary; buildings may have to be divided into frame structures, concrete or brick structures, vaults, foundations and excavations; machinery into electrical machinery, steam machinery, gas generating apparatus, etc.

The proper division or classification of the property to be appraised will vary with the different properties, depending perhaps on bookkeeping convenience and certainly upon the experience and ability of the men doing the particular work in question. After the arrangement of the general classification, detailed instructions must be such as to insure including all of the property and yet permitting no duplication, *e.g.*, the men taking foundations of buildings, must clearly understand whether or not their work includes foundations of machinery and similarly the machinery men must clearly understand how much, if any, of the foundations—sometimes practically a part of the building —they are expected to consider. The men taking tools and fixtures will find it necessary to frequently confer with the men taking buildings, because the most exhaustive instructions will usually be found inadequate to cover all fixtures, some of which become a part of the building.

Preliminary to taking up the inventory of property, it is very desirable to obtain from the owners, all maps, profiles, plans, data, records, contracts, stock-lists and other papers which will be of service in preparing, as far as possible, a complete inventory of the property to be appraised. This preliminary inventory should be worked up as fully as practicable, from the information

available, but without regard to cost or prices. The work is entirely office work, and consists merely in preparing in advance of field inspection, properly classified lists or records to be furnished inspectors as memoranda or guides from which to work in checking, verifying, adding or deducting, as may be found necessary, after an examination of the property through field inspection. If no records or data are available, then simply blanks, properly prepared, should be furnished, to be filled in by the field inspectors, but this method of procedure usually requires more experienced inspectors and considerably longer time in which to complete the final inventory. The particular classification of inventory which may be desirable to adopt for any particular appraisal, of course, depends upon the property being considered, capacity and experience of the employees, and the thoroughness and detail with which it is desired to carry out the work. Suggestions as to proper division and classification in appraisals of various properties will be found in Chapters IX and X, where forms used in actual appraisals have been reproduced. It is usually advisable to follow some standard form of classification, such as that set out in the "Methods of Uniform Accounting" issued by the Public Service Commissions of some States, or the forms adopted by some of the National Organizations of operators of public utilities or those suggested by the Interstate Commerce Commission.

Where corporations have diverted surplus earnings into the improvement of the property, receiving at the same time a fair rate of return on the investment, it has been held in some cases that the investment thus made should not be capitalized or recognized in valuations for certain purposes. In New York State the Commissions were originally authorized to permit the issuance of securities for only four purposes: (a) acquisition of property; (b) construction, completion, extension, and improvement of facilities; (c) improvement or maintenance of service; (d) discharge or lawful fund of obligations. This meant in effect, that where the earnings of a corporation have been invested in fixed assets, it could not later obtain the consent of the Commissions to reimburse its treasury on account of such expenditures, thus largely effecting the relation between surplus and capital. The present law of Massachusetts prohibits the capitalization of surplus earnings and a recent decision of the Massachusetts Gas and Electric Commission, with regard to the

Worcester Gas and Electric Company, held that surplus earnings expended for improvements and capitalized should not be recognized as property to be included in the valuation for the purposes of that case. The instances cited indicate the necessity for a knowledge of all attending circumstances, when undertaking a valuation, in order to determine the proper basis upon which to make up the inventory.

The proper perspective is necessary to the making of a correct inventory. It must be not alone absolutely full and complete, but also in sufficient detail to permit intelligently ascribing fair unit prices to the various parts of the property. Listing of minutia such as each tube in a boiler, each coil in a transformer or each bolt in car body would result only in needless expense and an accuracy, in the complete appraisal, that would be no more satisfactory than if a classification of units had been adopted to which proper prices for the article taken as a whole could be applied, *e.g.*, the type of boiler as a whole, the particular transformer complete, the whole car body ready for mounting. Variations from the standard adopted, with additions or omissions, must be noted, without too great detail, but sufficiently precise to permit accurate classification and pricing.

Even after the most careful work in preparation of an honest inventory, errors and omissions are bound to occur, for which compensation is usually made, under the head of "Contingencies" or "Omissions," by an allowance of a proper percentage, added to the total net cost. This percentage will vary in amount for different conditions, depending partly on the facilities offered, as access to corporation records, freedom for inspection, time allowed and care taken in preparation of the inventory, etc. Five per cent. ordinarily is not an unfair addition to the total net cost of the physical property to add to cover omissions and errors in inventory and pricing thereof and is quite frequently used. Both larger and smaller allowances, than five per cent., have been made by recognized authorities.

Field Inspection.—Although the men selected as field inspectors need not necessarily have had broad experience, they should be of unquestioned honesty, observant and capable of testifying in case of necessity, as to the identity and accuracy of their work.

It is advisable to have inspectors work in groups of two or more, as they tend to check one another, and the work will usually advance more rapidly than if the men work singly. Fur-

nished with blanks, or the preliminary inventory prepared in advance in the office, and equipped with note books, such instruments as may be required, and full and explicit directions under which they are to carry out the work, the inspectors are expected to check up all physical property, by a careful personal inspection, making full notes, descriptive of all property, with variations from the inventory, if furnished, noting particularly any peculiar conditions of installation which might affect cost, and adding any personal observations that may appear of value.

It is usually desirable to have the inspectors also note the existing condition of property, as to operating efficiency, state of maintenance or repair. The condition of property is usually indicated in the inspectors' reports by letters, for example: A, excellent; B, fair; C, poor; D, scrap; as has been used in appraisal work done by some of the Public Service Commissions. Another widely used method is to indicate the condition by a percentage, based on a comparison with new apparatus which is taken as 100 per cent. This method was used, for example, in the State appraisals of the Michigan and the Wisconsin Railroads.

It is quite customary and usually preferable to limit the work of the inspectors to checking and describing the physical dimensions and conditions of the property, leaving all pricing to be done at a later time in the office, either by the inspectors or other computers, under the direction of more experienced men, particularly qualified for this part of the work, which requires extreme care.

As inspectors' reports are turned in, they should be studied and analyzed, preparatory to applying the unit prices. This study may disclose contradictions or omissions, making a re-inspection necessary, or in certain instances, a second examination by other inspectors is advisable in order to check the fairness or honesty of some employees, or to verify the accuracy of the work being done.

Emphasis should be laid on the importance and necessity of having the inspectors make explicit notes and reports in proper books, or on forms which at any future time may be identified for each inspector. These field notes and reports should be properly indexed and safely filed away for convenient reference and identification, in case of future necessity, as the courts have held that the attorneys of either side have the right to call for the production of subordinates, with their notes and data, who

have been used in the preparation of the figures of a valuation on which a decision is to be based. Consequently, the importance will be recognized, not only of having men engaged on the appraisal who are reliable and trustworthy, but also of having available their notes and data from which they may refresh their memory; otherwise the entire appraisal may be thrown out as worthless.

Suggested Procedure.—A valuation to be complete in the fullest sense, must take into consideration not alone the original cost, present value, or cost of reproduction of the physical plant but also the intangible and non-physical values, the limitations of franchise, as well as the market quotation of securities. To complete a valuation of such broad scope, the following method of procedure is suggested:

(a) Obtain from the proper officials of the Company, data, drawings and specifications covering original construction as well as later additions, also lists of material and supplies, and if available, a complete inventory of all existing physical property. Where inventories are incomplete, as is usually the case, they must be completed by field inspection and in every case verified and checked. How thoroughly and with what detail inspection may be necessary, depends on the thoroughness of the appraisal being made. For example, test holes may have to be sunk in order to verify information as to excavation, foundations, buried pipes, duct lines, or other sub-surface structures. The size, quantity and condition of all physical property, must be determined.

(b) Obtain available data as to costs and prices, by examination of corporation vouchers, not only for the period in which the appraisal is being made, but covering also original cost. Classify the cost of different materials and labor, in accordance with that method which will enable a convenient and easy comparison for the appraisal work in hand. Particular attention should be given to expenditures during the early history of the Company covering items that may properly be qualified as "Development Expenses" such as interest, taxes and similar expenses during construction, checking the cost as ascertained from vouchers, with the book cost. The two are not likely to agree, due to destruction of old records, accidentally or otherwise, and the fact that expenditures may have been made and no vouchers received therefor.

(c) Examine the record books of the corporation, ascertaining

therefrom all information as to the issuance of stocks, bonds, or other forms of indebtedness, the cash received therefrom, records of transactions of the officials in authorizing contracts, and the prices thereof.

(d) A personal inspection and examination must be made as to physical property, by the individual in charge of the appraisal work, and a more or less detailed acquaintance had with the plant, and the conditions under which it is operating, even though the working out of detailed information is left to one's subordinates.

(e) Determine the unit prices to be used, and the percentages to be allowed in connection therewith, the fixing of unit prices and percentages to be added depends upon the basis adopted for the prices themselves.

(f) Using the completed inventory, the unit prices determined upon are to be applied, and the work carefully checked, to avoid errors. Two inventories, and two sets of unit prices may be necessary, if both the original cost, and the cost of reproduction is being determined. To the totals obtained from applying the unit prices to the inventory, should be added the percentages for engineering, contingencies, and administration or superintendence during construction, etc., in order to obtain the cost of the physical plant.

(g) If the depreciated or present value is desired, the amount of depreciation must be determined in accordance with the principles laid down in the chapter on "Depreciation" and this sum deducted from the cost, giving the present value of the physical plant.

(h) Investigate the actual operating conditions, method of serving the public, rates charged, system of providing for depreciation, and maintanance of the property.

(i) Ascertain the limiting conditions, in the Articles of Incorporation, charters, franchises, municipal contracts, or other governing obligations, determine whether local conditions are such as to promise fair treatment and a bright future for the corporation, or whether its business is likely to be interfered with, either through competition or popular opposition.

(j) Development expenses are determined from a consideration of the time necessarily consumed in building the plant under consideration, the rate of interest, taxes and other such

expenses, with proper allowance for remuneration to the original promoters of the enterprise.

(k) Consideration should be had as to whether good will, franchise or going value should be allowed for, and if so, the amount may be determined from a consideration of the matters set forth in another chapter.

(l) The sum of the physical plant value plus the development expenses, plus the value of franchise, good will, going value, or contracts, if any, will result in a sum representing one fair value.

The items to be determined in making a valuation to ascertain the total fair value of a utility property may be diagrammatically summarized as follows:

Net cost of physical plant.		
Contractor's profit.	Structural value.	
Engineering, Contingencies, etc.		
Expenses preliminary to beginning plant construction.		
Overhead expenses during construction.	Development expenses.	Total value.
Working capital.		
Superseded plant.		
Franchises.		
Good will.	Intangible value.	
Going value.		
Contracts.		

CHAPTER V

STRUCTURAL COSTS

Unit Prices.—Determination of the proper prices to employ in valuation work is, usually, not a very complicated matter. If there is a common purpose to be fair and base prices on facts, different engineers will be found to agree reasonably closely. The chief differences are apt to be due to lack of authoritative quotations and difference of opinion regarding proper allowances for changed conditions as between original and present costs.

The first thing to be decided is the unit prices to be affixed to the completed inventories. To intelligently fix a fair unit price, it will be necessary, where possible, to examine bills, vouchers, contracts, minute books and other records of the corporation, as well as to investigate local market conditions, both as to labor and material and obtain quotations direct from manufacturers. Every engineer, from the inspectors up, will be able, from his own experience, and data accumulated from previous work, and from the knowledge gained while making inspections of the property under consideration, to furnish information and suggestions that will conduce to the general fund of information which, drawn from many and varied sources, must be made the basis from which the final unit prices are worked up.

On the man in general charge of the appraisal rests the responsibility of harmonizing the unit prices fixed by his several assistants, whose experience and viewpoint, being different, may come to different conclusions for the cost of doing the same or similar work, *e.g.*, excavation for buildings, track-laying, building foundations, installing ducts, laying pipe. Nothing is easier, in discrediting an appraisal, than to show in "deadly parallel," unit prices, some of which, if correct for one piece of work, prove that the other prices used for similar work are absurd and incongruous. The importance of this harmony shows again the necessity for co-operation and frequent conferences between the appraisal experts. A general smattering knowledge or a tendency to deal in glittering generalities, does not qualify a man for

establishing fair prices. Without patient, painstaking effort, supported by experience and practical knowledge as to current market prices, the reliable framing of unit prices is an impossibility with consequent reflection on the entire results.

The making up of unit prices in any specific case will depend upon:

(a) The local conditions, as for example, character of soil in which the excavation is to be made, accessibility for the delivery of parts shipped in, conditions of the local labor market, both as to quality and supply, and similar local characteristics.

(b) The source and character of the information on which the figures making up the unit prices are based. The information will vary from mere hearsay to exact figures obtained for similar work under similar conditions, and the dependence to be placed on the source of information must be duly considered and weighed.

(c) The refinement to be used in making up unit prices. In some cases an average figure, based on proper experience and judgment, may prove as satisfactory as a figure laboriously worked out from a mass of varying data. There is always opportunity for abbreviating the work by due consideration of this matter by a competent expert.

(d) The relation of the unit price to the percentages to be added later.

(e) Whether or not depreciation is to be allowed in the unit price.

(f) Whether the unit price applies to the raw material or the finished product. For example, the purchase of a given number of yards of sand, concrete and stone results in the production of a yardage of concrete quite different from the sum of the yards of the three constituents.

(g) Whether the unit price includes the cost of the labor, material, supervision, administration expense, and incidentals or whether these items are to be kept separate.

In order to obtain a total fair value of property, it is of course essential to apply fair unit prices to the elements contained in the completed inventory. Two unit prices, both fair, and yet quite different in value, might be used; one, the higher, would include certain allowances which the other would not include, because added later as a percentage of the total net cost. As will be seen, the first method endeavors to fix the total cost, to

the corporation, of the item being considered, completely installed, including all allowances, but the second and more careful method, one which is now much in vogue, endeavors to ascertain the exact price paid for each item bought separately, then to add to the net valuation, obtained by applying such unit prices to the inventory, definite percentages to cover first, an allowance that would have to be paid a general contractor for doing the work of assembling and unifying the elemental parts, and second, an allowance to cover engineering, administration expenses, contingencies and omissions.

The practice varies somewhat, but a quite general basis of fixing unit prices, being the method used and recommended by the author, is to determine from a knowledge of local conditions, the fair prices for:

(a) "Raw Materials," so-called, as sand, cement, brick, rails, copper wire, pipe, lumber, including also complete elements such as transformers, meters, car bodies, boilers, pumps, engines, gas or electric apparatus, etc., delivered f. o. b. destination.

(b) Common, skilled and expert labor, both under normal demands and in case large pieces of construction work were undertaken.

(c) Small contractors, or "sub-contractors" services, *i.e.*, the price a small contractor would charge for a single piece of work, for example, digging trenches for gas mains, track laying, concrete in place per yard, brick work complete, etc.

From such information, it is practicable to establish fair unit prices for machinery apparatus and construction work, on the basis of cost to a corporation, or a general contractor, that is, on what has been termed "sub-contractor's basis."

Contractor's Profit.—The unit price made up on the "sub-contractor's basis" includes what may be fairly considered as only a manufacturers' profit for the production of the several elements which must be assembled into a harmonious, operating whole by some entrepreneur, for whose services and direct expenses, an allowance of 10 per cent., called "contractor's profit" is quite generally recognized as a fair and proper allowance. Where no such percentage is shown in valuation tabulations, it will usually be found that the unit prices allowed are enough higher to include the contractor's percentage. The items of contractor's profit, as well as engineering, incidentals and etc., if not included in the unit prices applied to the inventory to ob-

tain the cost of the physical property, may be added as a percentage, after the net value of the structures is obtained as above explained, or they may be grouped with non-physical values, but they are always included in one place or the other in every fair valuation, though perhaps not at first apparent. Except in the rarest cases, work will not be performed on the materials furnished without a profit to the contractor, and though unit prices may be made up on the basis of contractor's bids or contracts, without any added allowance for profit or contingencies, said bids or contracts have, of course, been made by the contractor to include a profit and necessary allowance for incidentals and contingencies. The percentage for contractor's profit is based on the cost of such labor, material and apparatus as is ordinarily contained in the inventory of the physical plant, aside from real estate, rights of way, material and supplies or other property purchased more advantageously by the corporation direct.

From experience, it has usually been found that it is as cheap or cheaper for a corporation to employ a general contractor to take charge of and direct any large piece of work, than to itself undertake to carry out the work. The reason for this is that working to definite plans and specifications, fitted by special experience for construction work, concentrating all effort and energy to a single purpose, a capable contractor can do the work more efficiently than the corporation, which is primarily equipped for operation and not for construction.

The percentage allowance of 10 per cent. is based upon the charge which has been frequently made by responsible contractors who undertook the work for the owner at the latter's risk. When the contractor assumes the risk, he will usually figure on from 20 per cent. to 50 per cent. additional to the estimated sub-contract cost depending on definiteness of contract and specifications, keenness of competition, contingency of accident or unfavorable conditions and size of contract or liability involved.

But such large percentages may be taken to cover omissions and contingencies which, in appraisal work, are provided for in separate and distinct allowance. Where a contractor can do work without stipulation and limitation as to its cost, that is, on the basis of "labor and material," he is usually willing to furnish his time and direct expenses for 10 per cent. on the cost.

Fluctuating Prices.—While current prices are the basis of the cost of reproduction, there are conditions where strict adherence

to such a rule would result in manifest unfairness to the corporation, if lower, and to the public, if higher than average or original cost prices. It is a well recognized fact, that the market prices of iron, steel, copper, pipe, cement and to some extent labor fluctuates, widely, and sometimes artificially so that it has been recognized as legitimate and just, in valuation work, to use market prices, averaged for a period of five years, preceding the date of appraisal.

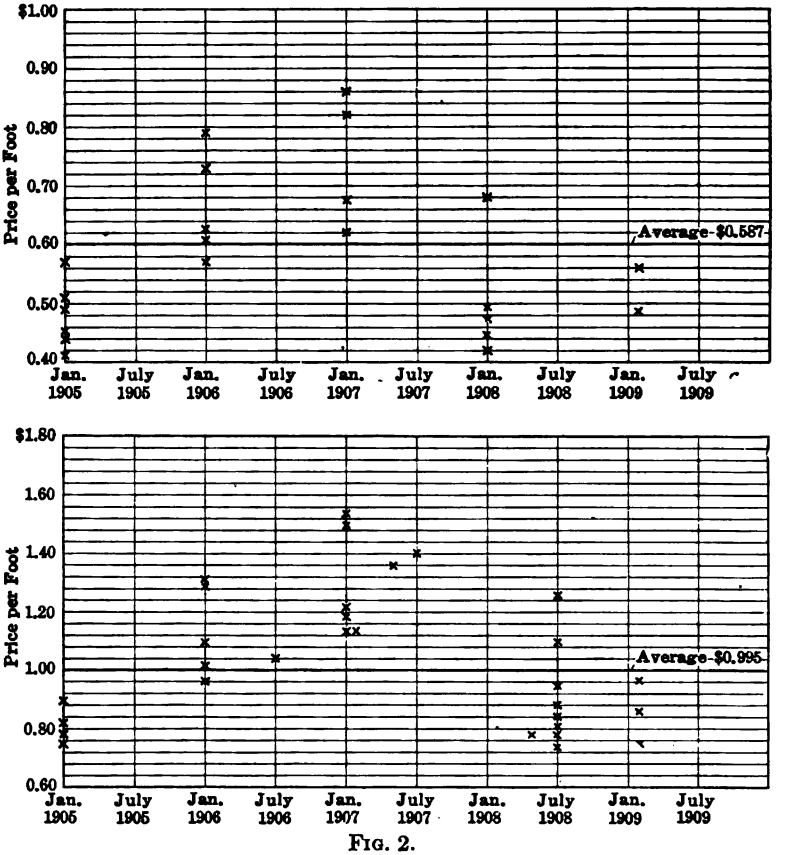


FIG. 2.

On the accompanying insert page are given curves showing the fluctuations in prices of cast iron pipe and certain metals during the past 13 years, and also Portland cement prices for 31 years to date. The wide fluctuations in the price of copper, the uniform price of steel rails, since the control of prices by the steel

corporation, and the gradual reduction in the price of cement, are noteworthy and interesting. As indicating the method of ascertaining average prices, the data used by the author in determining a fair average price for insulated lead-covered cables for use in an appraisal made in 1909, are shown in Fig. 2. The prices actually paid, for the particular class of cable indicated, by a number of different corporations in New York City, were first averaged for each, usually the result being plotted, as of January, in each year. Then the average of the total was obtained from a consideration of prices, regardless of the quantities of cable purchased, as indicated by the straight line.

From a study of these curves, it will be seen that great injustice may be done by taking the momentarily low price of an article, which fluctuates widely. Even averaging the price for a five year period does not always result in strict justice to either the corporation or the public. For example, the price of copper varied from a minimum of 11.5 cents per pound in 1902 to a maximum of 25.1 per pound in 1907. If an appraisal were taken during the year 1908, when the price was under 16 cents per pound, injustice would be done the corporation if it had purchased a large amount of copper in the early part of 1907 at the prices then existing. Similarly, the use of the prices of 1907, in the appraisal of corporation copper which had been purchased in 1904 and 1905, would be unfair to the public. Valuing cable which cost over $1.50 in 1907, at 99.5 cents, is to an extent unfair to the corporation. On the other hand, if purchased for less than 80 cents in 1908 the price of 99.5 is unfair to the public so that only reasonable justice can be expected or meted out by using the average prices.

Engineering Contingencies, Omissions, Etc.—It has become an accepted rule, in valuation work, to add a general percentage to the "general contractor's cost" or the "base cost" of the physical property, to cover the expense of engineers' or architects' fees, contingencies, incidentals, omissions of inventory, errors, city inspection, administration and legal expenses during construction, with other similar items. The percentage allowed may vary between wide limits, from a minimum of 8 per cent., customarily used by the Wisconsin Commission to cover all of these items to as high as 10 per cent. for contingencies and incomplete inventories alone, allowed in the State valuation of the Michigan Railroads. For engineering and architects' fees, 5 per cent. is

by far the more usual allowance, and if applied to all the physical plant, aside from real estate and supplies, is fair and reasonable.

It is quite customary, and usually necessary, both for individuals and corporations where doing construction for private use, or public service, to employ engineers and architects. The charge for such services rendered is usually based on the cost of the work which is supervised. The architects' charges have been more or less of a standard for the other professions, so that the following extract from the "Schedule of Charges" recently adopted by the New York "Local Chapter" of the American Institute of Architects, is an interesting guide as to such charges:

1. The Architect's professional services consist of the necessary conferences, the preparation of preliminary studies, working drawings, specifications, large scale and full size detail drawings, and of the general direction and supervision of the work, for which, except as hereinafter mentioned, the minimum charge, based upon the total cost of the work complete, as established by the American Institute of Architects, 1908, is ..... 6 per cent.

2 Residential work:

Private dwellings within the limits of the city of New York,

On the first $50,000 of cost ..... 8 per cent.

On the balance of cost, the minimum fee of ..... 6 per cent.

Private dwellings outside of the city of New York, including stable and other dependencies,

On the first $50,000 of cost ..... 10 per cent.

On the balance of cost ..... 8 per cent.

(The graduated commission applies only to the above two classes of residential work.)

3. Monumental, decorative and landscape work, special interior and cabinet work, alterations to existing buildings, in all cases whether in connection with federal, municipal, or other work ..... 10 per cent.

4. Designs for fabrics, furniture and fixtures, lighting fixtures, and special decorative work ..... 15 per cent.

5. Articles not designed by the architect, but purchased under his direction ..... 6 per cent.

The engineers, whether electrical, mechanical or civil, have usually charged 5 per cent. for entire supervision similar to the architects, although they have not held too uniformly to this rate as they are not bound together by precedent and organi-

zation as strongly and historically as are the architects, so that even 10 per cent. or 12 per cent. is sometimes charged.

Where organizations have kept an exact record of the cost of doing their own engineering, it has been found that such cost will not usually amount to much less than 5 per cent. on the cost of the property engineered. Except with respect to very large investments and investments of certain character, such as subways or complicated constructions, the percentage may run considerably above 5 per cent. as evidenced by the following:

"The engineering cost of the Rapid Transit Commission (New York City), from June 1, 1900, to July 1, 1907, was 6 per cent. The engineering cost of the Pennsylvania Railroad for its tunnels (under the Hudson and East Rivers and the Island of Manhattan) was 5.8 per cent.; of the Boston subway, 9.9 per cent.; the Boston tunnel and subway, 9.17 per cent.; and the East Boston tunnel, 6.17 per cent.; the engineering cost of the Center Street subway, practically completed under the Public Service Commission (New York City), was 6 per cent.; the present engineering cost to date of the 4th Avenue subway, not yet completed, is 7.8 per cent., and the evidence shows the total charge will run down to at least 6 per cent.

"The expense of making the Tri-Borough plans was $454,823.47, and upon a basis of a cost to construct said subway of $120,000,000, the engineering expense would be 0.37 per cent. The engineering cost of preparing the plans of the Pennsylvania tunnels was 0.7 per cent."

(It should be noted that the last two items of expense given do not cover the whole engineering expense involved.)

* * * * * * *

"My own conclusion is that the engineering expense of the Commission has been reasonable and if the great number of new subways which the city needs are to be constructed under the jurisdiction of the Public Service Commission, the people of the City of New York must expect that the engineering cost will run about 6 per cent. as in the past."[1]

The Railroad Commission of Wisconsin allows 5 per cent. to cover engineering, based on the cost of all physical property, except stores and supplies, whether for gas, electric, railway, telephone or water-works corporations. The Public Service Commission, First District of New York, has been accustomed to allow 5 per cent. for engineering, and a total of 15 per

[1] Report dated May 31, 1911, to Gov. John A. Dix by John N. Carlisle, page 6.

cent. to cover all the items, engineering, omissions, administration, etc., which is added to the cost of physical property, except real estate, rolling stock and stores and supplies. The Traction Valuation Commission of Chicago similarly allowed 5 per cent. for engineering, and on most property a total of 15 per cent. for engineering, incidentals and organization, except on rolling stock, tools, supplies and real estate. The St. Louis Public Service Commission allows 5 per cent. for engineering on all items of construction, except real estate. In the Consolidated Gas case the Master allowed 10 per cent. for "engineering and miscellaneous expense" on plant, which allowance was sustained by the Supreme Court decision. The United States Circuit Court of Ohio in the Columbus Railway & Light Co. case allowed 9 per cent. of the cost of the physical property for "general engineering, miscellaneous and other expense." In the appraisal of the steam roads the Railroad Commission of Washington allowed 3 1/2 per cent. on the cost of physical property, aside from real estate, stores, equipment and working capital, to cover engineering. The same Commission in the Puget Sound Electric Railway case allowed 7 per cent. for "superintendence by competent electrical engineers as distinguished from the services of construction engineers" and an additional 3 per cent. for "engineering and superintendence by constructing engineers." In the appraisal of the Michigan railroads for the State Commission 4 per cent. was allowed for engineering, based on the value of the permanent way and structure, but not the equipment.

It has been argued that little or no percentage should be added to cover omissions of inventory or errors in pricing, when making an appraisal, on the ground that every item of the plant is recognizable and capable of identification. Theoretically this statement is correct, but estimates of reproduction must be recognized as quite different from estimates made on plans and specifications for work proposed to be done, which makes the quantities definite, whereas such exact information is frequently lacking when making an appraisal, and it is impossible to make full examination of buried structures. Any one who has had practical experience in the employment of the class of men that must be engaged in the making of inventories and applying prices, recognizes the absolute impossibility of including each item of physical property, and the accurate pricing thereof. To

test the truth of this statement, it is only necessary for one to attempt to list every item in a particular room within a limited but reasonable time; when the list is complete, a leisurely checking it over will almost surely disclose certain items which have been omitted. Experience shows that items aggregating thousands of dollars in value are frequently omitted from inventories that are made under the ordinary stress of appraisal work, so that a reasonable addition, covered by a percentage, must be provided if a fair appraisal is sought. This percentage allowance will vary from 1 or 2 per cent. to 15 or 20 per cent., depending upon local conditions.

The Public Service Commission of New York, First District, has, with one exception, uniformly allowed 5 per cent. for contingencies, incidentals, incomplete inventories and administration expenses, during construction. In the single instance referred to, no allowance for omissions of inventory or error in pricing, was considered necessary. The Wisconsin Commission quite regularly allows 3 per cent. to cover legal expenses preliminary to construction, organization expenses, insurance, commission (not discount on bonds) and contingencies. 5 per cent. was allowed for contingencies in the state's appraisal of the Minnesota steam railroads. In the appraisal of the Chicago traction companies' properties, the Commission allowed 5 per cent. for incidentals, organization and incomplete inventories. The St. Louis Public Service Commission has allowed 5 per cent. for contingencies in addition to "some special percentages for contingency."

Real Estate.—The proper value to be allowed for real estate and right of way in appraisals is a question on which there is a wide difference of opinion. There would seem to be no logical reason why real estate or right of way, belonging to a utility company, should be valued on any other basis than that of similar property owned by an individual or corporation. It is undoubtedly true in many instances, that the building of utility properties, particularly railways, has increased the value of real estate to the owners of property adjoining, or in the vicinity of the new roads. In cases of sale or taxation, the increased value of such property is the only value considered, and it would seem as if the railway company, for example, should also benefit by the general rise in price. The acceptance of the theory that the corporation is entitled to increases in the value

of its real estate logically includes the statement that any decrease in value of the property must be also accepted by the corporation. It is conceivable that the use of property for car-barns or gas-works might depreciate the value of land in the vicinity, which as a general rule should be taken as the gage by which to measure the value of utility property. This position has been repeatedly affirmed by the courts, including the Supreme Court, which quotes with approbation a lower court, as follows:

"The value of the land depends largely upon the use to which it can be put, and the character of the improvements upon it."[1]

Regarding the proper basis of evaluating real estate Judge Hough in the Consolidated Gas Case held as follows:

"As to the realty, the values assigned are those of the time of inquiry; not cost when the land was acquired for the purpose of manufacture, and not the cost to the complainant of so much as it acquired when organized in 1884, as a consolidation of several other gas manufacturing corporations. It is objected that such method of appraisement seeks to confer upon complainant the legal right of earning a fair return upon the land values which represent no original investment by it, does not indicate land especially appropriate for the manufacture of gas, and increases apparent assets, without increasing earning power. Analogous questions arise as to plant, mains, services, and meters; the reported values whereof are the reproductive cost less depreciation, and not original cost to the complainant or its predecessors. It appears by indisputable evidence that some of the last items of property cost more than new articles of the same kind would have cost at the time of inquiry; that some are of designs not now favored by the scientific and manufacturing world, so that no one now entering upon a similar business would consider it wise to erect such machines or obtain such apparatus. In every instance, however, the value assigned in the report is what it would cost presently to reproduce each item of property in its present condition, and capable of giving service neither better nor worse than it now does. As to all of the items enumerated, therefore, from real estate to meters inclusive, the complainant demands a fair return upon the reproductive value thereof, which is the same thing as the present value properly considered. To vary the statement: complainants' arrangements for manufacturing and distributing gas are reported to be worth the results above tabulated if disposed of (in commercial parlance) "as they are." Upon authority I consider this method of valuation correct." * * *

[1] Columbus Southern Railway *vs.* Wright. 151 U. S. 481.

"The value of the investment of any manufacturer in plant, factory or goods, or all three, is what his possessions would sell for upon a fair transfer from a willing vendor to a willing buyer, and it can make no difference that such value is affected by the efforts of himself or others, by whim or fashion, or (what is really the same thing) by the advance of land values in the opinion of the buying public. It is quite immaterial that such value is affected by difficulties of reproduction."

* * * * * * *

"Indeed the causes of either appreciation or depreciation are alike unimportant, if the fact of value be conceded or proved."

* * * * * * *

"Nor can it be inferred that such (American) government intended to deny the application of economic laws to valuation of increments earned or unearned, while insisting upon the usual results thereof in the case of equally unearned, and possibly unmerited, depreciation."[1]

In the Kansas City Stock Yards Case, the Circuit Judge quotes the Supreme Court:

"It is not always reasonable to cast the entire burden of the depreciation on those who have invested their money in railroads"

and adds:

"The converse of this proposition is equally true. If the investor may not bear all the burden of the depreciation, he should not enjoy all the benefit of the appreciation."

"If improvements made in the vicinity of the property, the growth of city or town where it is located, the building of railroads, the development of the surrounding country and other like causes, give property an increased value, the owner cannot be deprived of such income by legislative action which prevents him from realizing an income commensurate with the enhanced value of his property."[2]

Some argument has been advanced that the proper basis of valuation is the assessed value, but as such value is usually a conservative, and "hard-times" value, below the price at which property can be purchased under ordinary conditions, it is not a proper basis of valuation, except for taxation purposes where the real estate of corporations should be placed on the same basis as other real estate.

An appraised value of real estate, which depends on the opinion of experts, will usually be found to be a very variable quantity.

[1] Consolidated Gas Company *vs.* City of New York. 157 Fed. 849.

[2] Cotting *vs.* Kansas City Stock Yards 82 Fed. 839, 846.

While the best experts base their opinions on some knowledge of actual transfers, a large element of personal judgment usually enters into their conclusions. Probably the safest method to pursue in determining the perplexing question of land value, is based on a study and comparison of bona fide sales of land adjoining or near the property being valued. In many instances, however, such method cannot be used in that property may have been held for years, in large tracts, without change of ownership. Under such circumstances, the judgment of the real estate expert is probably as fair a guide as can be used in determining values.

The Railroad Commission of Wisconsin has devoted much time and study to the proper method of determining real estate and right of way values. It has found that railways are "willing to pay two and a half to two and three-quarter times the market price of land, before they will use their power of condemnation in rural districts," but this value is largely due to the necessity of buying a comparatively narrow strip, perhaps 100 ft. wide, running through the land. In the well-known Madison case, the Wisconsin Commission's engineer, Mr. W. D. Pence, submitted a memorandum fully explaining the methods used by the engineers of that Commission, which methods are approved by the Commission, and therefore here quoted at length.

"The Sales Method.—The sales method of valuing real estate was used partially in the Michigan railway appraisals of 1900–1901, and in the light of the experience gained in that work the method was adopted in the Wisconsin steam road valuation made under the provisions of the Ad Valorem Assessment Law of 1903. It has since been extensively used in Wisconsin and elsewhere in connection with important valuations of public service properties for both rate-making and taxation purposes, and is generally accepted as a valuable aid to the judgment by experts engaged in such valuation work on a large scale. The sales method may be defined as a plan or process for the systematic collection and comparison of data relating to real estate transfers for the purpose of estimating true market realty values. It consists in a study of the transfers of neighboring property having conditions or characteristics similar to the land whose value is to be determined, and is intended to duplicate, as nearly as may be, the mental or judicial processes ordinarily employed by the so-called 'local real estate expert,' with a view to arriving at results approximating those which would be reached by such local expert acting without bias or suggestion. The sales method is capable of application in a variety of ways; in fact, is

as flexible in its possible applications as are the varied methods employed by individual local experts. Two interpretations of the sales method have been most commonly employed. In one of these the area and consideration in each sale of similarly situated land is found, and the average unit price (per square foot, per foot frontage, per lot, per acre, etc.), ascertained, and this unit applied to the tract under investigation. The other application of the method introduces what, in many cases, is believed to be an additional safeguard, consisting of the use of the average assessed value of adjacent or similarly situated lands, in combination with an average ratio or percentage representing the relationship of the assessed value of transferred lands to the total consideration paid for such transferred lands in the district or locality under consideration, all of these figures being based on the 'ground values' exclusive of the improvements thereon. Such use of assessment figures is designed to introduce, as far as may be, the results of the judicial processes of the assessor, who, at least in theory, serves on behalf of the public as an unbiased expert in the matter of relative valuations, and who attempts to make allowance for the peculiar attributes or characteristics of individual parcels of real estate in any given locality or neighborhood of a city. In the broader and more flexible applications of the sales method, the expert adopts one or the other of the processes just outlined, or blends the two together in such fashion as to yield the most consistent and trustworthy final result. In the process of valuing a tract of land involving conflicting data, as in the case under consideration, the expert user of the sales method on this flexible basis derives a series of tentative results similar to the results representing the judgments of individual local experts. The judicial function involved in the discriminating selection of data and in the derivation of final results is exercised along essentially parallel lines with the two classes of experts here compared. The further act of the judgment in selecting a final preferred valuation figure in the light of a group of preliminary or tentative results is identical in the two cases. In the particular valuations here considered, the similarity of the basis is further emphasized by the fact that the results by the sales method represent the composite judgment of four members of the Commission's expert staff, as against an equal number of local real estate experts employed by the company. The foregoing statement relates to the revised or final figures submitted at the conclusion of this memorandum, these figures replacing the preliminary or tentative land valuations formerly submitted on behalf of the Commission's staff. Although it is frankly conceded that the tentative land valuation figures first reported were derived by a comparatively restricted application of the sales method, issue is here taken with certain claims made in the argument by counsel for company. In view

of the repeated favorable reference by counsel to the judgment of the assessor with respect to relative values ('Argument on Behalf of Company,' pp. 30, 31, 32, 37, 39), the criticism of a similar use of the assessor's judgment by the Commission's experts need scarcely be considered, except with respect to the misapprehension by counsel ('Argument,' p. 43), as regards the fluctuation of the assessment ratio in Madison. Entirely aside from the claim that assessment ratios should not be depended upon in making land valuations, counsel contends that, in any event, a general assessment ratio should not be used in the case under consideration, chiefly because of a supposed 'radical difference as between different sections or localities' in the city of Madison. For the purpose of throwing some light on this point, Mr. A. E. James, statistician of the tax commission, was requested to prepare a comparative exhibit based on Madison city sales for a period of years, classified with respect to kind or locality as follows:

Group 1.....Business section.
Group 2.....Best residence section.
Group 3.....Middle class residence section.
Group 4.....Poor residence section.

"Table A gives, in condensed form, the results of this investigation, which covered some 905 verified real estate transfers during the four year period, 1905–1908, with an aggregate consideration of approximately $3,000,000. A somewhat similar, though less discriminating, comparison made in 1906 covering sale and assessment figures for the seven-year period ending with 1904 affords the following general average ratios for the four groups of property of 71 per cent., 67 per cent., 65 per cent. and 64 per cent., respectively, with an average for the aggregate for the seven-year period of 66.7 per cent. To bring the comparison still closer to the point at issue, 'locality ratios' were computed from carefully verified transfers within an area of some 26 blocks, including a district of from three to four blocks in all directions from the tracts owned by the Madison Gas and Electric Company. The results of these compilations for a period of six years, ending in 1908, are embodied in Table B, which also includes the revised general ratios for the entire city for the corresponding years. The ratio for the three years, 1906–1908, for which most recent data as to present values are available, average 65.6 per cent. local, as against 64.7 per cent. general.

"The foregoing comparisons do not justify the claim of counsel with respect to the extreme variations at Madison. The contrary appears to be the case.

"The question as to whether the general or local assessment ratio should be applied, or assessment figures be used at all, depends entirely

on circumstances which the expert, familiar with the use of the sales method, will investigate and take into account before reaching his final judgments as to the value of a given tract of land. In this particular instance the values of the local and general ratios chance to differ but little.

TABLE A.—COMPARISON OF ASSESSMENT RATIOS WITH REFERENCE TO KIND OF PROPERTY. BASED ON A SECTIONAL DISTRIBUTION OF MADISON CITY SALES.

Year	Group	No. of sales	Total assessment	Total consideration	Assess't ratio per cent.
1905	1	4	$16,400	$26,100	62.83
	2	54	127,365	188,321	67.63
	3	68	126,870	203,555	62.32
	4	152	200,225	354,614	56.47
Total sales, 1905		278	$470,860	$772,590	60.95
1906	1	10	$52,100	$82,600	63.08
	2	41	97,470	143,100	68.10
	3	47	91,650	132,038	69.41
	4	110	144,880	224,400	64.56
Total sales, 1906		208	$386,100	$582,138	66.33
1907	1	3	$21,200	$30,680	68.10
	2	48	151,520	229,430	66.04
	3	42	104,570	160,730	65.06
	4	127	199,158	328,707	60.58
Total sales, 1907		220	$476,448	$749,547	63.58
1908	1	6	$213,000	$269,825	78.94
	2	45	140,770	237,350	59.30
	3	44	78,200	131,745	59.35
	4	104	157,000	266,590	58.89
Total sales, 1908		199	$588,970	$905,510	65.03
Grand total, four years, 1905–1908		905	$1,922,378	$3,009,785	63.87
Summary for four years by groups, 1905–1908: group 1		23 (2%)	$302,700	$409,205	73.96
2		188 (21%)	517,125	798,201	64.78
3		201 (22%)	401,290	628,068	63.89
4		493 (55%)	701,263	1,174,311	59.71
Grand total, four years		905 (100%)	$1,922,378	$3,009,785	63.87

TABLE B.—COMPARISON BETWEEN ASSESSMENT RATIO FOR THE IMMEDIATE LOCALITY OF THE MADISON GAS & ELECTRIC COMPANY'S PROPERTY WITH CORRESPONDING VALUES OF THE GENERAL ASSESSMENT RATIO FOR THE ENTIRE CITY OF MADISON

Year	No. of sales	Locality assessment ratio, per cent.	Assessment ratio for entire city, per cent.
1903	6	62.8	64.0
1904	8	75.2	62.9
1905	9	61.6	62.0
1906	3	61.1	65.4
1907	4	68.9	63.6
1908	10	66.8	65.0
	Average....	66.1	63.8

"**Calibration of Sales Method.**—In viewof the close similarity as to fundamental basis of the sales method as compared with the local expert method of valuing real estate, particular interest and importance attaches to any specific cases affording a direct comparison of actual valuation results by the two methods made under normal or balanced conditions. The results of two such comparisons on a large scale are fortunately available for the present discussion, one involving some 300 blocks (more than 3 square miles) of representative residential property in the city of St. Paul, the other of some 500 acres of valuable railway terminal lands in the city of Milwaukee.

"The St. Paul investigation was conducted by Mr. T. A. Polleys, secretary of the Chicago, St. Paul, Minneapolis & Omaha Railway Company, who for a number of years had made extensive studies of real estate sales and valuations in Wisconsin, Minnesota and neighboring states. After serving on a committee made up of local real estate experts, charged with the inauguration of a reform in the basis of assessing real estate in the city of St. Paul, Mr. Polleys conceived of a plan for calibrating or testing the accuracy of the sales method of valuing lands, with a view of stimulating local interest in the matter. To this end he chose the district in the westerly portion of the city of St. Paul, comprising over 300 platted blocks, extending from Western Avenue on the east to Cleveland Avenue on the west (a distance of 3 1/2 miles), and from Marshall Avenue on the north to Osceola Avenue on the south (a distance of nearly a mile), as indicated by the shaded rectangle on the accompanying map. The district was selected for the reason that

the great activity for several preceding years would insure ample sales data upon which to base estimates of value, and because of the representative characteristics of the territory, such as the following: Values ranging from one dollar to over one hundred dollars per foot front; a portion of the lots built over and a portion vacant; some localities increasing very rapidly in value and others little or none; the area comparatively uniform in topography, although somewhat broken in places; in short, a district affording a wide range of conditions for such a comparative test. The process was directed to the determination of the correct average 'ground' value per foot, exclusive of improvements, in a given year (1907) for a distance of one block along a given street, each block frontage being termed a 'locality' for the purposes of this test. The average ground values per foot front for each of the 277 'localities' was ascertained by a flexible application of the sales method, the work being performed chiefly by Mr. Polleys personally, who then requested some fourteen highly qualified real estate experts in the city of St. Paul to submit their estimates of the same values. In order to arouse interest in the investigation, Mr. Polleys charted his own determinations and submitted duplicate copies of the same to each of the experts, with the urgent request, however, that they should not be influenced by his figures, and further that values be submitted only on those blocks where they had direct personal knowledge of values. The experts served without compensation, acted independently of each other, that is, without conference or collusion of any sort, and, so far as known, were entirely free of bias or suggestion in preparing their estimates of value. Of the fourteen experts invited some twelve submitted more or less complete responses, most of them asking for additional time for fuller deliberation as to values. The condensed results of this remarkable investigation are shown in the accompanying Table C, and the complete exhibit for a single representative street (Lincoln Avenue), comprising some 21 localities, are given in Table D. In further illustration of the methods pursued in these studies, there are submitted with this memorandum, in addition to the map, a copy of a paper describing this investigation (Real Estate Valuations, by Thomas A Polleys—Proceedings Minnesota Academy of Social Sciences, Vol. I, pp. 59–78, 1907). I am also able to submit as information, through the courtesy of Mr. Polleys, the original figures of the twelve experts and the reduction sheets leading to the final comparative figures, these papers having been loaned to the Commission's engineer during a recent personal investigation of the conditions surrounding this test of the sales method. While on the ground, conference was held with the president of the St. Paul real estate exchange, who participated in the Polleys investigation and who regards the sales method as an exceedingly valuable aid to the judgment, subject to limitations of a character in certain situations which are recognized and felt by all local experts who are called upon to value lands.

TABLE C.—COMPARISON OF RESULTS BY TWO METHODS OF VALUING REAL ESTATE (A) BY LAND SALES METHOD; AND (B) BY LOCAL EXPERTS. INVESTIGATION BY THOS. POLLEYS, AT ST. PAUL, MINN.

Classification of Property	No. of blocks	Average value per front foot		Excess (B) over (A)	
		(A)	(B)	Amount	Per cent.
Group 1 Less than $10 per front foot	96	$6.15	$6.70	$0.55	9.0
2 $10 to $20 per front foot	69	14.10	15.45	1.35	9.6
3 $20 to $40 per front foot	82	28.55	29.55	1.00	3.5
4 Above $40 per front foot	30	63.10	63.20	0.10	0.2
Totals	277	$20.95	$21.75	$0.80	3.8

TABLE D.—POLLEYS' INVESTIGATION OF SALES METHOD OF VALUING REAL ESTATE COMPARISON OF RESULTS ALONG LINCOLN AVENUE, ST. PAUL

Along Lincoln Avenue (3 1/2 miles)	Average ground value per front foot			Excess (B) over (A)	
	(A) By land sales process	(B) By local experts		Amount	Per cent.
		No. of experts	Value		
1. Dale to St. Albans	$47.00	7	$50.85	$3.85	8.2
2. St. Albans to Grotto	49.00	8	51.20	2.20	4.5
3. Grotto to Avon	49.00	8	51.80	2.80	5.7
4. Avon to Victoria	50.00	9	51.65	1.65	3.3
5. Victoria to Milton	35.75	7	36.05	0.30	0.8
6. Milton to Chatsworth	29.00	8	29.85	0.85	2.9
7. Chatsworth to Oxford	27.50	8	26.55	0.95	3.5
8. Oxford to Lexington	24.00	7	24.20	0.20	0.8
9. Lexington to Dunlap	15.00	7	16.45	1.45	1.0
10. Dunlap to Griggs	12.00	7	12.20	0.20	1.7
11. Griggs to Syndicate	8.50	7	8.90	0.40	4.7
12. Syndicate to Hamline	8.50	7	9.35	0.85	10.0
13. Hamline to Albert	7.00	7	8.05	1.05	15.0
14. Albert to Pascal	7.00	7	7.95	0.95	14.0
15. Pascal to Saratoga	5.00	6	6.40	1.40	28.0
16. Saratoga to Snelling	5.00	5	5.90	0.90	18.0
17. Macalester to Cambridge	9.00	6	9.35	0.35	3.9
18. Cambridge to Baldwin	9.00	5	9.20	0.20	3.2
19. Baldwin to Fairview	9.00	5	9.20	0.20	2.2
20. Fairview to Prior	3.50	5	3.90	0.40	11.4
21. Prior to Cleveland	3.50	5	4.10	0.60	17.2
Average for 21 blocks	$19.75	7	$20.60	$0.85	4.3

"Tables C and D show, in the last column, the percentages variation between the results of the sales method and the averages of the results of the local experts. It is seen that the tendency of the sales method is to give deficient results to an average amount of 3.8 per cent. for the entire 277 localities or blocks.

"This result or tendency is strikingly confirmed by the other instance above referred to, consisting of the valuation of terminal lands belonging to the Chicago, Milwaukee & St. Paul Railway Company in the city of Milwaukee, made in 1903 under the auspices of the Tax Commission. These lands amounted to upward of 500 acres in the aggregate, scattered through some 15 wards or assessment districts of the city, and having an aggregate valuation of approximately $6,000,000. The market value of these railroad lands was determined by specially qualified local real estate experts under the personal direction of Mr. F. W. Adams, the secretary of the railway company, who preserved a remarkable balance of judgment throughout the work. The state valuation staff, under the personal direction of Prof. W. D. Taylor, engineer for the state board of assessment, used the sales method on a basis consistent with local conditions. The final results differed by only 3.5 per cent., the results by the sales method being the lower, as in the Polleys investigation.

"As a result of the elaborate series of tests above described, it appears that, taking the results by the 'local expert method' as a basis, the 'sales method' tends to give slightly lower results, the difference appearing to be about 4 per cent. on the average.

"Final Revised Values.—The final valuation figures for the two tracts of land submitted by the Commission's valuation staff in the light of all available evidence, including the testimony submitted by the local experts and the results of the comparative tests of the sales method above described, are as follows for the year 1908:

"Block 131.—The revised valuation of block 131 is placed by the Commission's staff at $42,000, with a possible range from $37, 000 as a minimum to $47,000 as a maximum.

"Part of Block 126.—The valuation of this tract presents special difficulties, owing chiefly to extreme scarcity of trust-worthy sales figures in the immediate locality. The revised valuation of this tract is placed by the Commission's staff at $18,000 with a possible range from $16,000 as a minimum to $20,000 as a maximum."

The decision in the Madison case then continues with the opinion of the Commission as to value of the methods used by its engineers as follows:

"The preceding memorandum submitted by the engineer appears to us to be of the greatest importance. It describes the methods used by the engineer and his staff in determining the value of real estate and

shows that these methods, when properly employed, are scientific and that they lead to correct conclusions. The engineers of the staff have employed these methods very extensively in the valuation of real property in all parts of the state, and generally with satisfactory results. The engineers are also unbiased in their attitude toward proceedings such as those involved here. They are witnesses for neither petitioner nor respondent and have only one aim in mind; namely, that of arriving at the truth through the application of correct methods of investigation, and their experience and training entitle them to be classed as experts in such matters. It is, of course, a fact that the determination of the market value of any piece of real property is ultimately a matter of judgment, and that no method of valuation yet discovered will disclose the exact value or do much more than indicate, within perhaps fairly narrow limits, the figure at which the value should be placed. But it is believed that the methods thus employed by the staff are the best that have thus far been used for this purpose. While in actual application they may not disclose the actual figure at which the value should be fixed, they cannot fail to be of the greatest importance in appraisals of this kind. When properly employed, they will disclose facts that indicate approximate values, and facts that are of the greatest aid to the judgment in arriving at the fair value in each particular case.

"The main question involved in the valuation of a utility for rate-making purposes is to find the fair value, or that value upon which the investors are entitled to reasonable returns and which is equitable as between the investors on the one hand and the customers on the other. This applies as much to the valuation of the real property of the utility that is used or useful in connection with the services it renders, as to any other part of the property that is so used, or to the plant as a whole. In this particular case, this value would seem to be somewhat lower than the valuation which was claimed by the respondents and considerably greater than the estimated value of the real property by the petitioner's witnesses. The facts indicate that the fair value is found about midway between the maximum and minimum values as determined by the staff. In fact, it is our judgment that it should be placed at about $44,500 for the lots located in block 131 and at about $17,500 for the lots in question in block 126, or at about $62,000 for both. Of these amounts, according to the estimates of the engineer in his first valuation, about 83 per cent. of the former item should be allotted to the gas plant, while 17 per cent. of the former and all of the latter should be allotted to the electric plant."[1]

In valuing city property, it is quite customary to add 10 per cent. for plottage, namely the extra cost of acquiring property

[1] State Journal Ptg. Co. *vs.* Madison Gas & Electric Co. Decision dated Mar. 8, 1910, p. 528—Railroad Commission of Wisconsin.

in small pieces and bringing it under a single ownership. In the same way, 25 per cent. of the value of an inside lot is added to determine the value of a corner lot. For narrow strips of land 100 ft. wide or less, used for right of way from one-third to five times the value of the adjoining land is added to cover the increased cost of such pieces.

The Public Service Commission of New York, First District, has used appraised values, assessed values, and double the assessed value, in determining the fair value of real estate, in its various decisions.

The Board of Railway Commissioners of South Dakota, in appraising the railway properties of that State, took 2 1/2 times the actual cost of farm land at the time of appraisal, as the value allowed for right of way. The Texas Commission has usually added from 25 to 50 per cent. additional to the value of adjoining land, to obtain the value allowed in the valuation of the steam roads of that State.

While the steam railroads usually prefer to purchase necessary real estate outright, the inter-urban electric roads, telephone, telegraph and transmission companies very frequently purchase the right to use property or easements instead of taking title to real estate. Such investments result in an increase in the intangible property, as of course the companies purchasing such rights of way have no title whatever to the real estate, to show for their investment.

Paving.—There exists considerable difference of opinion and some confusion of thought as to whether the value of pavement over structures in streets should be included in appraisals and allowed as part of capitalization. If the fundamental purpose of the inquiry is to ascertain the actual investment made, then only the cost of such paving as was laid by the corporation should be considered, if the cost of reproduction new of such pavement as was put down at the expense of the corporation is sought, then such treatment of the paving may be proper, but when the problem is to find the cost of reproduction new of property at a particular date, the estimated cost of paving necessary to be laid in replacing the substreet structure, should be taken.

It is assumed in every case that the pavement in the street does not belong to the corporation whether the structure in the street has been installed before or after the laying of the pavement. Of course if the pavement has been laid first, and the

structure afterward the expense of placing the pavement must be borne by the corporation, and under such circumstances as these, there is usually little question but that the estimated cost should be allowed the corporation as a part of its expense of construction, and is therefore proper for capitalization. The Wisconsin Commission[1] has uniformly ruled that in a valuation for rate purposes the cost of pavement reproduction will not be allowed unless the pavement has been laid at the expense of the corporation. This view has been taken, though somewhat equivocally, by the Iowa Supreme Court which held that the cost of pavement over gas mains laid before the pavement was put down, should not be included as part of the value on which rates should be based, expressly ignoring the expense that would be incurred in case it were found necessary to remove the pipes at the expiration of the franchise, or for other cause, explaining that most of the paved streets were paralleled by unpaved alleys or parkways, in which pipes might be laid without removing the pavement and admitting "undoubtedly the values of the pipe are somewhat enhanced because of their location, but the immediate cost of opening and replacing the pavement is not the criterion for the value which should be adopted."[2]

The Public Service Commission of New York State, First District, has both allowed and excluded the value of all pavement over street sub-structures. It was allowed for example in the Third Avenue Railroad Co. Reorganization Case,[3] but in several recent decisions the value of such paving as has been laid after the structures were in place has been excluded. The present attitude of this Commission is clearly set forth, for example, in its recent opinion published a few months ago in the case of Kings County Lighting Company, where in passing on the company's claim for an allowance for all paving over its structures the commission says:

"The practical effects of such a theory are interesting and important. Suppose a locality at the time a gas company was started and its pipes

[1] State Journal Printing Co. *vs.* Madison Gas & Elec. Co., decided March 8, 1910 (4 W. R. C. R. 501, 554); Ashland *vs.* Ashland Water Co., decided Nov. 1, 1909 (4 W. R. C. R. 273, 307); Racine *vs.* Racine Gas Light Co., decided Jan. 27, 1911 (6 W. R. C. R. 228, 240).

[2] Cedar Rapids Gas Light Co. *vs.* Cedar Rapids 120 N. W. 966.

[3] Case No. 1181 Plan of Reorganization Third Ave. Railroad Co. Decision dated July 29, 1910, Public Service Commission, First District, New York.

laid were content to have unpaved or cheaply paved streets, cobblestone, macadam or gravel being used. Suppose that the people come to demand better paving, being dissatisfied with earlier conditions, and that asphalt, brick or granite block with a concrete base is laid throughout the area. Naturally, the people appreciate that they must pay the cost of the repaving; but according to the theory of counsel for the company, the gas consumer must also pay more for gas. In other words, every time the streets are improved, not only do taxes or assessments go up, but higher gas rates are justified, notwithstanding the fact that the company may not have paid one dollar in connection therewith. If this theory is correct, citizens must consider in connection with every civic improvement its effect upon rates for gas, electricity, telephone service, water, transportation and every other service which involves the use of the subsurface of the streets. If such improvement increases the cost of reproducing the undertaking supplying such service, higher rates will thereby be justified than would be reasonable before such improvement is made.

"Applying the theory of counsel to the case in hand, he asks that *in toto* about $250,000 or $300,000 be added in determining the "fair value" of the property, such sum including not merely the net cost of the paving, but 'overhead charges' amounting to 20 per cent. or thereabouts. A return of 10 per cent. thereon would be from $25,000 to $30,000. Upon the basis of actual sales for 1910, this is equivalent to from 4 to 5 cts. per thousand. Thus, the net result of counsel's theory is that this Commission is asked to fix a rate higher by 4 or 5 cts. than would otherwise be reasonable, and the reason offered in essence is that since the Kings County Co. laid its mains and services the city of Brooklyn and later the city of New York has materially improved the paving over those pipes without expense to the company.

"The company's counsel apparently relies upon a single thesis to maintain his theory. He may not claim that the pavement is the property of the company, for it is not in any degree. The company may not alter the pavement without the city's permission, nor sell, transfer or remove it, and in case the company does take up its pipes and leave the street, the pavement must be restored. Secondly, the company did not lay the new paving. It was laid by the city after the company's pipes were in the ground. In the third place, the new paving represents no expenditures upon the part of the company. This fact is important, for it is conceivable that a company might not own certain property, might not have actually constructed it, and yet the expense of such construction, if paid by the company, might properly be included in the amount upon which the company would be entitled to earn a fair return. But in this case, the new pavement under discussion does not represent any investment or expenditure by the company.

The relaying of the original paving does and it has been included in 'net cost' as above set forth."[1]

The above quotation very fairly sets forth the usual arguments for omitting from corporation valuation such part of paving as has not been laid at the expense of the corporation, but such partisans apparently fail to appreciate the illogical position of setting out to obtain the cost of re-production, and then instead of taking that cost to include only such part of said cost as appeals to them. If the date of construction is to be the test, then original costs should be considered; if the date of appraisal is the test, then cost of replacement throughout must apply. It is manifestly illogical and unfair to pretend to figure the cost of re-producton and then omit certain items from such basis of valuation apparently for the reason that the inclusion of such items would result in a considerable increase in the value of corporate property. Because a corporation has had the judgment and foresight to install its structures in advance of or coincident with paving, perhaps carrying its investment for years without profit, that is no reason for excluding a part of the cost of replacement any more than it would be to omit increase in real estate values. As the New York Commission itself says in the decision above referred to, the Supreme Court has held "in order to ascertain that value (fair value being used for the convenience of the public) the original cost of construction, the amount expended in permanent improvement, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under regular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case."[2]

So that the cost of reproduction is not the only necessary consideration, but one of the considerations which should be used, there exists no judicial pronunciamento for taking a part of the estimated cost of reproduction and leaving out the other part. More important than conclusions of commissions or opinions of State Courts is the decision of the Supreme Court, which, in at least one case is pertinent. The Consolidated Gas Company questioned the right of the New York State Legislature to reduce

[1] Case No. 1273 J. G. Mayhew *vs.* Kings County Lighting Co., decision dated Oct. 20, 1911, Public Service Commission, First District, New York.

[2] Smyth *vs.* Ames 160 U. S. 466.

the price of gas in New York City from $1.00 to 80 cents. It was admitted that the city, at its own expense, had built costly pavements over the gas mains of the company, and that the subsurface of the streets had become so crowded with other structures since the mains were laid, as to increase the cost of their laying, thus making the cost of reproduction $5,560,000.00 greater than the original book cost, yet the Special Master and the Judge of the Circuit Court expressly recognized and allowed such increased value which in appeal was later approved or at least not objected to, by the U. S. Supreme Court in determining the value on which a fair rate of return should be based. The exact wording of the Supreme Court in the gas case is so definite and illuminating as to the time of valuation and increase in values allowable that we quote it.

"And we concur with the court below in holding that the value of the property is to be determined as of the time when the inquiry is made regarding the rates. If the property, which legally enters into the consideration of the question of rates, has increased in value since it was acquired, the company is entitled to the benefit of such increase. This is, at any rate, the general rule. We do not say there may not possibly be an exception to it, where the property may have increased so enormously in value as to render a rate permitting a reasonable return upon such increased value unjust to the public. How such facts should be treated is not a question now before us as this case does not present it. We refer to the matter only for the purpose of stating that the decision herein does not prevent an inquiry into the question, when, if ever, it should be necessarily presented."[1]

Water Power.—The valuation of a water power is one of the most complex and difficult problems in appraisal work. The cost of the dam, building and machinery, of course, does not represent the total value of a developed water power. Before any installation of plant, the undeveloped water power had a dormant value.

The determination of the value of water powers has been attempted in at least two distinct ways.

(a) Market price,—that is the price that might be paid for power, based on local opinion, market quotations or future expectations. In Wisconsin, testimony adduced before the Railroad Commission, indicated that water powers in that

[1] Wilcox *vs.* Consolidated Gas Co. 212 U. S. 19.

State were worth about $80 per H. P., on the basis of uniform power throughout the year.

(b) Capitalization of an amount somewhat less than the difference between the sum of the fixed charges and operating expenses of the hydraulic plant, compared with similar costs of a steam plant located at the market to be supplied from the hydraulic plant.

The capitalization of the difference in the cost of operating a hydraulic compared with a steam plant, has several times been considered by the Railroad Commission of Wisconsin. The attitude of the Commission is indicated, for example, in determining the price to be paid by the city of Kaukauna for the local electric plant, which included a lease for 200 H. P. permanent power, and 100 H. P. revocable power, when it says:

"In considering this lease the company's engineer concluded that the same has a value for the 200 H. P. for permanent power. He figures that if the 200 H. P. were used every hour in the year at the rate of 3 1/2 lb. of coal per horse-power-hour and that such power were generated by steam, the coal cost would amount to $11,200. The difference between this cost and the $2000 per year, if the water cost $10 per H. P. with the cost of operation of the steam auxiliary when the water was low being considered, would give a saving of approximately $3460. This value, capitalized for the 76 years which the lease has yet to run, would give a present value of this lease of $43,136.

"The city's contention as to the value of this lease is about as follows: The fact that the rent is to be readjusted every 10 years is held as a point which makes it very likely that each year the adjustment will have the tendency to bring the price per H. P. up to just what it is worth. It maintains that for the present 10-year period the price per H. P. will likely be $12 to $12.50 and that there is no way of telling what the price may be for the next 10-year period. The fact that the buildings and plant equipment of the electric company stand on leased ground belonging to the canal company is also considered as a detrimental feature of the contract. The attitude of the canal company to get full value out of the water power is considered as sufficient reason for saying that this lease is really of no value, but a distinct liability, inasmuch as back rental must be paid.

"In making a determination as to the value of the lease the real point would seem to be: Can a saving in operation cost of this utility be made by using the water power, and, if so, just what such saving may be? If we consider the 200 permanent H. P. and figure a load factor of 50 per cent., which would be very good for a plant of this kind, we would find 876,000 horse-power-hours needed in the operation

of this plant for a year. Assuming then, the 3 1/2 lb. of coal per horse-power-hour and deducting 983,410 lb. of coal which the company report shows was necessary besides the water power, we have 2,082,590 lb. of coal necessary in addition to what was used in the operation of the plant. Using $4 per ton for coal, we have a fuel cost of $4165. The water power cost, assuming $12 per H. P. would be $2400, would result in a saving of $1765 by using the 200 H. P. of water power. This being a saving in operation, a deduction must be made for the operating expense of taxes, which the electric company must pay by virtue of the lease. The taxes on the water power amount to $500 at least. This leaves a saving of $1265 per year. In connection with this saving, it should be remembered that the present 10-year period, during which time the $12 per H. P. rent would seem reasonable, has only six more years to run. There is no way to forecast what amount may be asked for and agreed upon for the next 10-year period. It would seem reasonable to suppose that the canal company will bring the rent up to just such a point as will give only a large enough margin of saving to keep the electric company from going over entirely to steam-power generation. What this point may be is not known, but the fact remains that an arbitration is provided for in 10-year periods, and considering the disposition of the canal company to get as much as possible for this power, the future value of this lease beyond the present 10-year period is certainly speculative. It is not to be considered that any arbitration board would act unjustly in its award. We must assume that any such board will fix the rental at a fair figure regarding what the value of such power is generally rated at the time of the arbitration."[1]

The market price obtainable for water power is somewhat analogous to the market price of securities of any utility property. It depends ultimately on the earning power and in states where rate control is possible, may lead to erroneous conclusions. Where no rate control exists other than that arising through competition, the value of a water power is clearly determined by the cost of generating power, in a competitive market, from some other source of energy, such as fuel.

In any consideration of the value of water power, it is important to differentiate between uniform power and that which fluctuates, depending upon the rainfall, or other conditions. Ordinarily a much higher price per H. P. for uniform power is allowable than that which is only available during times of high

[1] In redetermining just compensation to be paid Kankauna Gas, Electric Light & Power Company. Decision, dated Dec. 26, 1911. Railroad Commission of Wisconsin.

water, although occasionally a hydraulic plant supplementing the supply of another station can obtain a uniform price for all of its output regardless of variation in delivery.

An approximate but quick way of ascertaining whether a water power is worth anything or not, considered on the basis of earnings and ignoring its reproduction value, is to assume figures with regard to the cost of its operation and maintenance, as shown, by way of illustration, in the following table:

Labor of operation	2	per cent.
Oil, waste supplies and extras	1 1/2	per cent.
Repairs	1 1/2	per cent.
Taxes	1	per cent.
Depreciation	2	per cent.
Sinking Fund	3	per cent.
Total	11	per cent.

If the cost of installation, complete, is $100 per H. P. and the developed energy can only be sold for $15 per H. P. per year, it will be seen that the water power really has little value, unless prospective, because the return on the investment will only amount to the difference between the sum of the items given in the table, $11.00, and the price obtainable, $15.00, consequently no financier, with his eyes open, will invest in as uncertain a project as a water power which will only bring a return of $4.00 on every $100.00 put in, that is, 4 per cent.

CHAPTER VI

DEVELOPMENT EXPENSES, INTANGIBLE EXPENSES, NON-PHYSICAL COSTS, OVERHEAD EXPENSES

General.—The expenditures made for the actual construction of the physical plant are only a part of the total cost of any completed property.

"There can be no true test other than the physical valuation, and to such physical valuation there may be added certain other items."[1]

The present line of division between the costs of the physical plant and those of the non-physical elements of a utility property is a more or less variable and arbitrary one. There exists such a considerable difference of opinion among those conversant with the subject as to just the proper class in which these non-physical costs shall be grouped that no generally accepted theory has yet been established.

As has been indicated in the preceding pages, good practice inclines to the inclusion, with material property, of those items of expense which are inherently a part of physical plant cost and are largely regulated thereby, that is, such expenses as manufacturers' profit, the charges of sub-contractor, or general contractor, engineers' or architects' fees, as well as such company superintendence, clerk hire, office and legal expenses and such other incidentals which, as a part of the administration of the work of construction, may logically and properly be included with the cost of the physical structure. Those other items of cost which are incurred through originating and completing the arrangements necessary but preliminary to the beginning of construction, such as legal and technical expenses, interest on capital which is used in preparing the entire property to begin the earning of an income, taxes, both those in connection with the organization of the company, and those accruing during the construction period, as well as discounts on securities, brokerage,

[1] Des Moines Water Company *vs.* City of Des Moines, Decision of Judge McPherson, dated September 16, 1911, U. S. Circuit Court for Southern District of Iowa.

reasonable promotion profit, also working capital, and, under certain conditions, superseded plant, explained more fully in detail in the following pages, may be properly grouped under the head of "Development Expenses."

Some writers and experts have used "development" in connection with the expenditures made in developing an income, that is, after the physical structure and commercial organization are prepared to begin service, it will require appreciable time in which to put the business on a paying basis, and during that period the deficits accruing have been capitalized as "Development Cost" but the more general classification of such items, namely those incurred in developing income, is covered by one of the usual definitions of "Going Value."

The line of demarkation between expenses accruing on account of capital lying idle while the property is being prepared for service, made a part of capitalization, and that expense charge accruing later on account of failure of the investment to earn a fair return, either capitalized or charged to operation, is at the point where the structural plant as a whole or its several parts or units are completed, ready to begin operation and commence to earn an income.

"The proper period for the capitalization of Development Expenses ends when operation actually begins."

"Securities ought not to be issued to cover operating expenses, fixed charges or dividends after that time (beginning of operation) except possibly in a most unusual case when such procedure is absolutely necessary to preserve the undertaking."[1]

It must be admitted, however, that owing to the prevailing lack of uniform practice, some of the intangible elements grouped under "Development Expense" have been included, and in certain methods of estimating, must be considered a part of "Going Value." On the other hand, some authorities consider that certain such items as interest during early operation, should not be capitalized at all, either under the head of "Development Expenses" or "Going Value," but rather paid out of earnings, the same as any other operating expense.

"But it ordinarily happens, during the first few years of operation, that the company does not earn a fair return. How, then, are the

[1] Opinion dated July 29, 1910, denying application Third Avenue Railroad Company. Public Service Commission of New York, First District.

investors to be made whole? There are two solutions: one is to capitalize the losses or deficiencies below a fair return, and all the other elements which are said to be included in 'going-concern.'" . . . . . "The other solution is to charge all such expenses to operation, to attempt to make no fine-spun distinctions, and then to permit the company to charge in later years rates sufficient to offset its deficiencies below a fair return in the first few years."[1]

The Public Service Commission of New York, First District, has used the term "Development Expenses" in its printed opinions and decisions, for some years. It will be seen that the items covered by the term correspond to those mentioned by the author:

"There are certain expenses connected with every undertaking which are not represented by physical property but which must be incurred before the plant is operated. These relate to the initial promotion of the scheme and the organization of the company. Investors must be interested, lawyers and engineers must be consulted, and franchises and permits must be secured. Interest and taxes during the period of construction must be paid, and as there are no earnings, they must be included as part of the cost of the undertaking. There are also other expenses connected with the experimental and trial operation of machinery and the adjustment of various parts, etc., which antedate operation."[2]

"The foregoing items of valuation do not include any allowance for easements or for other real estate values in excess of the assessed valuation. Neither do they make any allowance for franchise values nor for a considerable amount of development expenses, as, for example, interest during period of construction on capital used in construction, reasonable profits of promoting the enterprise, preliminary legal expenses of organization and other legal preliminaries, cost of complying with various preliminary requirements of law. All of these items would be absolutely essential disbursements in the reproduction of any existing railroad, and they would add considerably to the figures of valuation given in the foregoing estimate if proper allowance were made for them. . . . . It is to be borne in mind in this connection that physical assets are not the only real and valuable properties of a company upon which it is entitled to a fair return. There are numerous

[1] Opinion and order, dated June 23, 1911, in the matter of the gas and electric rates, charged by the Queensborough Gas and Electric Company. Public Service Commission of New York, First District.

[2] "Opinion and Order dated June 23, 1911, Public Service Commission of New York, First District, in the matter of the gas and electric rates charged by the Queensborough Gas and Electric Company.

other elements which may be properly regarded as capital charges to be considered."[1]

In the Brooklyn Borough and Kings County matter, the Public Service Commission of New York added over 23 per cent. for "preliminary and development items," including working capital, to the present value to obtain the grand total. In another decision relating to the Kings County Company, the same Commission added 16 per cent. to the net cost including real estate to cover Development Expenses, and in the Queensborough Gas and Electric Company case, over 22 per cent. to present value to cover Development Expenses and working capital.

The Public Service Commission of New York, Second District, has very concisely stated its views with regard to many of the items included in Development Expenses in their opinion on the application of the Rochester Corning Elmira Traction Company, for authority to issue securities to provide funds for a proposed electric road. After giving the estimates covering the cost of producing the physical plant, the Commission says:

"Although the foregoing is believed to be as nearly a correct estimate of the actual cost of the road as can be made in the absence of exact knowledge as to quantities, we deem it wise to add thereto 5 per cent. for any unforeseen contingencies, or an aggregate amount of $316,435. To cover the cost of legal expenses, organization tax, tax upon stock to be issued, the expense before the Board of Railroad Commissioners in procuring a certificate of public convenience and a necessity, the expense before this Commission upon this proceeding, the expense of marketing the securities of the company, engineering and other details not necessary to specify with particularly, we have computed the amounts capable of reasonably precise computation and think it best upon the whole to allow for all items of this character an additional 5 per cent. amounting to the sum of $316,435. We have also allowed for working capital the sum of $100,000, and for the services of those engaged in organizing the enterprise another 5 per cent. upon the estimated cost. The aggregate of these several percentages is the sum of $1,049,305, which with the estimated cost, makes a total of $7,378,020."

[1] Case No. 351. Page 9. Monheimer *vs.* Brooklyn Union Elevated Company, Brooklyn Heights Railroad Company, etc. Opinion and Order Public Service Commission of New York, First District.

"This is in brief a rough sketch of the process observed in reaching the allowance of capitalization which we propose to make. It should be noted that the percentages which we have allowed are wholly based upon the circumstances of this case, many of which it is impracticable to detail with any degree of fullness at this time. It is to be understood that none of these allowances are to be regarded as binding upon the Commission in case of applications of other companies. It has not been designed to establish any precedent in the determination of these amounts, and the Commission will feel itself at liberty in other applications of like character to proceed absolutely upon the circumstances of each case and fix allowances for services and expenses of the character of those under discussion upon such principles and for such reasons as may approve themselves at that time.

"It should, however, be understood that applicants must always be prepared to give evidence of services rendered and expenses incurred to the end that the commission may be prepared to make such allowance in capitalization as the facts of the case may justify.

"If we deduct from this sum $4,000,000 for the amount of the authorized capital stock, the remainder would constitute a bond issue of $3,378,020. Unquestionably these bonds will not sell at par, and an allowance should be made for the discount necessary to float them upon the market. No proof has been offered as to the amount for which they can be sold. We are unwilling to consent to their being put upon the market at less than 85. Making the proper computations for selling them at this figure, and also allowing for interest upon the bonds for one year at 5 per cent. to be paid from the proceeds, a total issue of bonds to the amount of $4,207,914 would be necessary. Making the authorization for bonds $4,210,000 and stock issue $4,000,000, we have a total issue of stock and bonds of $8,210,000. The interest charge at 5 per cent. upon these bonds would be $212,500 as against the assumed charge of $216,000 hereinbefore set forth."[1]

Mr. B. J. Arnold, of Chicago, one of the most prominent consulting engineers engaged in appraisal and valuation work, in discussing reproduction values in relation to intangible values, has testified that in addition to the value of the physical equipment, there are intangible values, which he called "Development Expenses," and covered by additional allowances to provide for:

"Legal Expenses in connection with:

"Preliminary promotion, organization and incorporation of company,

[1] Application Rochester Corning Elmira Traction Co. Decision, March 30, 1908. Public Service Commission, New York, Second District.

consent of State Commission, property owners' consent, consents of local authorities, consolidation of companies, and terminal arrangements, also for trackage right of way, agreements bridge terminal arrangements, and leases between companies."

"Technical expenses in connection with:

"Preliminary survey and location of line, estimates of cost, estimate of earnings, preparation of prospectus, maps, for property owners' consents and consents of local authorities."

"Promotion expenses:

' Cost of organization prior to actual construction."

"Profits of promotion including original organization and consolidation, 5 per cent. to 10 per cent. on $8,700,000."

"Financial expenses:

"Discount and commission on sale of securities 5 per cent. to 10 per cent. upon capitalization. Interest and taxes during construction, 3 per cent. to 6 per cent. on the approximate value of the physical property, taking that interest for approximately a year's time as a maximum, and for six months as a minimum."

"Permanent right of way."

"Property owners' consents, bridge charges."

"Fill on Coney Island Avenue."

"Change of grades on Coney Island Avenue. Coney Island Avenue right of way."

"Cost of obtaining trackage rights. Bridge arrangements and exchange of power arrangements."

"Additional sales value."

"Cost of acquiring real estate."

"Equity in terminal at Coney Island."

"Real estate not used in operation of road."

"Buildings not used in the operation of the road."

"Working capital."[1]

The Railroad Commission of Wisconsin has not divided the non-physical expenses, to be added to the cost of the structural plant in ascertaining the total value of property, along the same lines as indicated above. With the physical plant has usually been included on allowance of 12 per cent. for engineering and supervision, interest during construction, contingencies, etc., with a separate estimate of going value or "earning value," so that in the same way the Commission recognizes the necessity

[1] Minutes of testimony, Case No. 1134, September 15, 1909. Monheimer *vs.* Coney Island & Brooklyn Railroad Company, Public Service Commission of New York, First District.

of allowances for development expenses in one class or another. For example, in discussing corporation accounts, it says:

"These accounts, with the records upon which they are based, should show the cost of each of the different parts of the plant, the cost of engineering, superintendence and management, the amount that was allowed as interest on the capital during the construction period, the amount, if any, at which the bonds were discounted, the basis upon which the stock was issued, the promotion expenses, if any, the basis upon which the contracts for construction were let, the cost of the franchises that were obtained, and all other items. . . . . Contractors' profit is an item that usually enters into the cost. . . . . Interest on the cost during the period of construction would seem to be one of the necessary elements that should be included in the total cost of the plant. . . . . The fact that interest on the capital used must be paid is too well settled to be questioned here. . . . . Whether this (discount on bonds) is a legitimate cost to be included in the cost of construction will perhaps depend upon the circumstances in each particular case. If the utility is needed, and the capital for it can be had on no better terms, then it is difficult to say on what grounds such discounts should not be included in the cost of the plant. To so include it has been and is the almost universal practice. . . . . As a rule is it not safe to enter upon the erection of works of this character without having provided for efficient supervision of the same. Such supervision costs money, and this cost ordinarily is a proper charge to construction. . . . . Owners and promotors are undoubtedly as much entitled to fair compensation for legitimate and valuable services, as any one else. . . . . In the construction of plants of this kind, a great deal of capital is required, and this cannot be had without cost. The services of engineers and superintendents must also be obtained, and this is combined with another class of outlays. In addition to this, something should also be set aside for insurance and contingencies of various kinds. These items are legitimate outlays in undertakings of this character, and are usually placed at from 10 to 18 per cent. on the remaining expenses of the cost of construction.[1] "The element of cost, by reason of interest during construction, is one which cannot be escaped. It is present to some extent, no matter what the method of financing the construction may be." . . . . "The amount of the working capital required by the plant, rather than the question as to whether something should be allowed for such capital, is the issue raised by the testimony."[2]

[1] Hill *vs.* Antigo Water Co. Decision August 3, 1909, Railroad Commission of Wisconsin.

[2] State Journal Printing Company *vs.* Madison Gas & Electric Company. Decision, March 8, 1910. Railroad Commission of Wisconsin.

The propriety, necessity and legitimacy of making appropriate allowances for the items generally grouped as Development Expenses, in valuing property, has never been questioned by properly informed individuals, Commissions or Courts. Although the term as such, may never have been used judicially, frequent decisions expressly recognize and justify allowances being made for these items of expenditure.

"Of the other items, those for organization and the expense of procuring franchise are not shown by the testimony to have been illegitimately expended, nor considering the period of time over which the various items were expended, and the different organizations through which the properties went, an unreasonable charge for that purpose.

"The discount of $22,800 upon certain bonds sold by one of the constituent companies, was a reasonable discount for the negotiating of bonds of that character, at the time they were sold, and the amount of such discount represents actual cost to the Company.

"In any estimate for replacement value, allowance should be made . . . . . for all engineering expenses, miscellaneous expense and other expense accruing during the construction of a plant, costing the indicated sum, would seem to be reasonable not only in view of his testimony, but in view of the testimony of other witnesses in the case.

"The figures referred to, contained no allowance for interest upon the amount invested, and accident insurance, during the construction period, which should be necessary if a plant of this kind, description, value and price were to be built. Such interest charges are obviously proper to be added."[1]

In the hearings before the Public Service Commission of New York, First District, in the Coney Island "Ten Cent fare case,"[2] Mr. Frank R. Ford, of Ford, Bacon & Davis, introduced during his testimony a very exhaustive analysis of the items that, in the case of a New York Company, must be considered in making up an estimate of the expenses covering the period previous to beginning construction. Mr. Ford's exhibit is so complete and will be of such service as a guide to anyone interested in considering Development Expenses that the table in full is here reproduced.

[1] Report of special Master, Circuit Court of the United States, Southern District of Ohio. Columbus Railway & Light Co. *vs.* City of Columbus.

[2] Case No. 1134, J. Monheimer *vs.* Coney Island & Brooklyn Railroad Company. Public Service Commission for the First District, New York.

CONEY ISLAND & BROOKLYN RAILROAD COMPANY

Inventory of Work and Expense Items of Reproduction New as of Aug. 31, 1909, of Intangible Property Acquired During Promotion Period

Promoter's organisation	Legal department	Technical department
PRELIMINARY		
Study of situation. Preparation of general data. General investigation of laws. Interesting other parties. Meetings and correspondence.	Conferences and correspondence with promoter covering generally State and local transportation laws.	Conferences and correspondence with promoter. General examination and memorandum on situation.
PROMOTER'S SYNDICATE		
Formation. Meetings. Consultations with attorneys and engineers as to general plans and procedure. Conferences and correspondence with engineers on report, revision of plans, supplementary reports, etc. Conferences and correspondence with attorneys on legal procedure, etc. Plans and estimates for early financing. Outline of financial plans.	Conferences and correspondence with promoter as to plans for syndicate, proposed agreement, etc. Draft of agreement and revision. Attendance at meetings of syndicate. Examination of and report on statutes, ordinances, etc., relating to street railways Consultations with promoter as to plans and legal procedure.	Formal report involving: Study of population, its growth, density and direction of movement, etc. Study of traffic; other companies, competing and non-competing, and for this situation; liability of development, etc. Selection of route, with alternatives. Selection of power-house and car barn. Estimates of cost of construction and equipment under different plans. Estimates of gross earnings and operating expenses under different plans for a period of years.

CONEY ISLAND & BROOKLYN RAILROAD COMPANY—*Continued*

Promoter's organization	Legal department	Technical department
ARTICLES OF ASSOCIATION AND CERTIFICATE OF INCORPORATION		Study of operating agreements with other companies.
		Maps, profiles, plans, etc.
Consultations with attorneys.	Examination of statutes.	Conferences and correspondence with promoter and attorneys.
Consultations with engineers.	Consultations with promoter and engineers.	
Meetings of incorporators.	Organizing and conducting meeting of subscribers to articles of association.	Preparation of papers for filing with Secretary of State.
Meetings of directors.		
Preparation of papers for filing with Secretary of State.	Preparation of papers for filing with Secretary of State.	
Collection of subscriptions of not less than $1000 per mile and affidavits thereto.	Preparation of minutes, by-laws, etc., and conducting regular meetings of directors and stockholders.	
STATE AND LOCAL AUTHORITIES	Attendance at Albany.	
PREPARATORY	Conferences and correspondence with promoter and engineers on form and procedure.	Conferences and correspondence with promoter and attorneys.
Conferences and correspondence with attorneys and engineers on form and procedure.		
Planning campaign and organizing force.		
BOARD OF ESTIMATE AND APPORTIONMENT. (a) APPLICATION		
Conferences and correspondence, formal and informal, with members of Board and its engineers, other than at regular hearings.	Preparation of application.	Conferences with promoter and attorneys.
	Conferences and correspondence, formal and informal, with members of Board, etc., other than at regular hearings.	
Preparation of data and reports on local companies and comparisons in other cities relative to franchises.	Revision and amendments of application.	
Revision and amendments of application.	Conferences with promoter and engineers relative thereto.	
Conferences and correspondence with attorneys and engineers relative thereto.		

CONEY ISLAND & BROOKLYN RAILROAD COMPANY—*Continued*

Promoter's organization	Legal department	Technical department
(b) FIRST PUBLIC HEARINGS		
Publicity campaign, editing newspaper advertisements, circulars, etc.; attending meetings of property owners, commercial bodies and others. Attendance (reference to select committee). Preparation for further hearings, additional data, etc., to meet objections. Conferences and correspondence with attorneys and engineers relative thereto. (The above items for each hearing.) Securing attendance of experts for testimony.	Preparation. Attendance. Conferences and correspondence with promoter on results. Preparation for further hearings.	Preparation of data and papers. Attendance. Conferences and correspondence with Board's engineers. Preparation of additional data. Conferences and correspondence with promoter and attorneys.
(c) MEETINGS OF SELECT COMMITTEE		
Attendance. Preparation of data. Examination of proposed modifications and amendments to franchise, including: Revision of estimates and plans and preparation of counter proposals, etc. Conferences and correspondence with attorneys and engineers relative thereto. Securing attendance of experts for testimony.	Appearance. Preparation of data. Examination of proposed modifications and amendments, etc. Conferences and correspondence with promoter and engineers. Conferences and correspondence with Corporation Counsel.	Attendance. Revision of plans and estimates, maps, etc. Conferences with promoter and attorneys.
(d) FINAL HEARING		
(Same items as for first hearing.)	(Same items as for first hearing.)	(Same items as for first hearing.)

CONEY ISLAND & BROOKLYN RAILROAD COMPANY—*Continued*

Promoter's organisation	Legal department	Technical department
APPROVAL OF MAYOR		
Attendance before Mayor.	Attendance before Mayor.	Attendance before Mayor.
CERTIFICATE OF PUBLIC SERVICE COMMISSION		
Preparation of petition and papers required. Preparation for hearing. Conferences and correspondence with attorneys and engineers relative thereto. (At this hearing applicant must prove necessity, bona fide of enterprise and financial ability to carry out enterprise.) Attendance at hearing. Attendance at subsequent hearings (adjournments). Preparation of further data and information. Conferences and correspondence with commission, formal and informal. Conferences and correspondence with attorneys and engineers relative thereto.	Preparation of petitions and papers required. Preparation for hearings. Conferences and correspondence with promoter and engineers. Appearances at hearings.	Preparation of data and estimates. Conferences and correspondence with promoter and attorneys. Testimony and attendance at hearings. Conferences and correspondence with commission's engineers.
APPROVAL OF CAPITALIZATION BY PUBLIC SERVICE COMMISSION		
Preparation of papers and data for hearing. Conferences and correspondence with attorneys and engineers relative thereto.	Preparation for hearing. Conferences and correspondence with promoter and engineers.	Preparation for hearing. Conferences and correspondence with promoter and attorneys.

CONEY ISLAND & BROOKLYN RAILROAD COMPANY—*Continued*

Promoter's organization	Legal department	Technical department
APPROVAL OF CAPITALIZATION BY PUBLIC SERVICE COMMISSION—*Continued*		
Conferences and correspondence, formal and informal, with members of commission. Attendance at hearing. Examination of testimony and preparation of additional data and papers for further hearings. Conferences and correspondence with attorneys and engineers relative thereto. Attendance at subsequent hearings.	Conferences and correspondence with members of Commission. Appearance at hearing. Examination of testimony and preparation of additional data. Conferences and correspondence with promoter and engineers. Attendance at subsequent hearings. Attendance in payment of capital stock tax.	Conferences and correspondence with Commission and its engineers. Attendance at hearing. Examination of testimony and preparation of additional data. Attendance at subsequent hearings.
PROPERTY OWNERS' CONSENTS AND OPTIONS		
PROPERTY OWNERS' CONSENTS		
Attending meetings of property owners. Conferences and correspondence with attorneys. Conferences and correspondence with chief solicitor. Personal attention to large property owners. General supervision of work. Preparation and inspection of tax lists. Conferences with attorneys relative to legal proceedings to secure consents. Preparation for and attendance at trials.	Preparation of petitions and releases. Conferences and correspondence with promoter. Tax lists and preparation, etc. Attending meetings. Preparation for legal proceedings to secure consents. Conferences and correspondence with promoter. Attendance at trials. Organising solicitors.	General maps showing owners and frontage. Individual plans to accompany transfers.

CONEY ISLAND & BROOKLYN RAILROAD COMPANY—*Continued*

Promoter's organization	Legal department	Technical department
RIGHT-OF-WAY OPTIONS		
Conferences with engineers and attorneys on recommended private right-of-way routes. Inspection of properties, investigation as to availability, names and location of present property owners, prices of real estate, etc. Conferences and correspondence with attorneys and real estate brokers covering form and securing of options, etc.	Conferences and correspondence with promotor. Form of options, etc. Meetings with vendors' attorneys.	Conferences and correspondence with promoter, inspection of recommended properties, etc.
REAL ESTATE OPTIONS		
Inspection of recommended car barn and powerhouse, etc., sites. Conferences and correspondence with engineers. Conferences and correspondence with real estate brokers. Conferences and correspondence with attorneys on form of options. Meetings with vendors. (Option would probably be obtained on property not used in final design.)	(Same as for right-of-way.)	Surveys to determine availability. Estimates of comparative economy.

CONEY ISLAND & BROOKLYN RAILROAD COMPANY—*Continued*

Promoter's organization	Legal department	Technical department
OTHER RIGHTS AND CONSENTS		
COMMISSIONER OF BRIDGES		
(The general right to operate over the East River bridges would be covered by Board of Estimate and Apportionment, but details of operation would be arranged and directed by the Commissioner of Bridges.) Application to commissioner, with outline of proposed operation, type and weights of equipment, track and overhead construction. Conferences and correspondence with attorneys and engineers relative thereto. Meetings with commissioner. Conferences and correspondence with other companies using bridges. Examination of contracts.	Conferences and correspondence with promoter and engineers relative thereto. Meetings with commissioner and his attorneys. Conferences and correspondence with other companies using the bridges. Examination and approval of contracts.	Study of bridge operating conditions, with recommended plans for operation, estimates of earnings, maps, plans, etc. Conferences and correspondence with promoter and attorneys. Meetings with commissioner or his engineers. Conferences and correspondence with other companies using bridges. Examination and report on contracts.
COMMISSIONER OF PARKS		
Conferences and correspondence with commissioner to obtain consent to franchise, approval of proposed type of track construction, design and location of poles, paving, grades, etc. Conferences and correspondence with attorneys and engineers relative thereto.	Conferences and correspondence with commissioner and his attorneys. Conferences and correspondence with promoter and engineers.	Conferences and correspondence with commissioner and his engineers. Conferences and correspondence with promoter and attorneys. Plans and estimates.

CONEY ISLAND & BROOKLYN RAILROAD COMPANY—*Continued*

Promoter's organisation	Legal department	Technical department
BOROUGH PRESIDENT		
Conferences and correspondence with borough president and his engineers to obtain approval of proposed type of construction, location of poles, paving, grades, etc., including submission of plans and specifications. Conferences and correspondence with attorneys and engineers relative thereto.	Conferences and correspondence with borough president and his attorneys. Conferences and correspondence with promoter and engineers.	Conferences and correspondence with borough president and his engineers regarding proposed construction, grades, paving, etc. Conferences with promoter and engineers. Maps, plans and estimates.
TRACKAGE AND OTHER AGREEMENTS WITH CORPORATIONS		
Meetings with officials. Conferences and correspondence with attorneys and engineers. Consent of Public Service Commission and Board of Estimate and Apportionment. Estimates of costs, rentals, etc. Preparation and examination of agreements.	Attendance at meetings with officials of other corporations. Conferences and correspondence with promoter and engineers. Consent of Public Service Commission and Board of Estimate and Apportionment. Tentative agreements. Final agreements. Attendance at execution of agreements.	Attendance at meetings with officials of other corporations. Conferences and correspondence with promoter and attorneys. Opinion on form of proposed agreements. Preparation of data for use before Public Service Commission and Board of Estimate and Apportionment. Attendance at hearings. Estimates on equity agreements.
FINANCING		
PROSPECTUS		
Preparation of and editing. Conferences and correspondence with attorneys and engineers relative thereto.	Conferences and correspondence with promoter and engineers. Preparation of condensed opinion for use prospectus.	Conferences and correspondence with promoter and attorneys. Preparation of letter for use in prospectus.

CONEY ISLAND & BROOKLYN RAILROAD COMPANY—*Continued*

Promoter's organisation	Legal department	Technical department
NEGOTIATIONS WITH BANKERS AND INVESTORS		
Detailed plans for financing. Conferences and correspondence with attorneys and engineers relative thereto.	Detailed plans for financing. Conferences and correspondence with promoter and bankers.	Conferences and correspondence with promoter and attorneys as to plans.
(a) STOCK UNDERWRITING SYNDICATE		
Interesting investors. Tentative agreement. Meetings and conferences working toward final agreement. Plans for carrying out provisions of agreement, collection of subscriptions, voting trusts, interim and participation certificates, etc. Conferences and correspondence with attorneys and syndicate relative thereto.	Conferences and correspondence with promotor. Preparation of tentative agreement. Attendance at meetings between promoter and syndicate. Final agreement. Conferences and correspondence on form of certificate and preparation of form. Attendance in execution of agreement. Participation certificates, interim certificates, etc.	Attendance with promoter at meetings. Special estimates.
(b) BOND UNDERWRITING SYNDICATE		
Interesting bankers. Conferences and correspondence with their engineers. Tentative agreement. Meetings and conferences working toward final agreement. Plans for carrying out provision of agreement, collection of subscriptions, voting trust, interim and participation certificates, etc. Conferences and correspondence with attorneys and syndicate relative thereto.	Conferences and correspondence with promoter and engineers. Preparation of mortgage and trust deed. Search of titles. Preparation of tentative agreement. Attendance at meetings between promoter and syndicate. Final agreement; interim certificates, participation certificates, agreements. Attendance in execution of agreement.	Attendance with promoter at meetings. Conferences and correspondence with promoter and attorneys in regard to mortgage trust deed. Preparation of data for use therein. Special estimates.

CONEY ISLAND & BROOKLYN RAILROAD COMPANY—*Continued*

Promoter's organization	Legal department	Technical department
FORMAL ENDING OF PROMOTION PERIOD		
Transfer of papers and documents. Execution of releases, assignments, etc.	Transfer of papers and documents, execution of releases, assignments, etc.	

INVENTORY OF EXPENSES DURING PROMOTION PERIOD

Promoter's organization	Legal department	Technical department
PRELIMINARY		
Assistants' time. Stenographers' time. General office expenses: Rent, light, etc. Postage, telephone and telegrams. Books—record, statistical, legal, etc. Files and office furniture. Miscellaneous. Traveling.	Typewriting. Notary fees. Recording fees. Certified copies. Traveling expenses. Directors' fees. Printing. Miscellaneous. Fees to State. Copies of consents, decrees, etc. Transcripts of minutes. Tax lists. Trustees' legal expenses. Retainers in special suits. Directors' and executive committee fees.	Time and expenses of engineers, and other assistants. Typewriting and other expenses.
PROMOTER'S SYNDICATE		
Chief assistant to promoter. Assistant as to engineering. Assistant as to accounting and statistics.		

INVENTORY OF EXPENSES DURING PROMOTION PERIOD—*Continued*

Promoter's organization	Legal department	Technical department
Record clerks (including bookkeeping).		
Stenographers (including filing).		
Chief consent solicitor.		
Assistants.		
Allowance to other members of promoter's syndicate for time and expenses.	FRANCHISES AND OPTIONS	
General office expenses:	Payments to property owners for consents.	
Rent, light, etc.	Lump sum payments for franchise.	
Postage, telephone and telegrams.	Payments for options on real estate.	
Books—record (minutes, etc.; accounts, etc.).	Commission and expenses of real estate broker in securing options.	
Filing system.	Payments to title company for lists of property owners and details in connection with properties.	
Office furniture (including typewriters, adding machine, etc.).	Publication required by law.	
Printing and stationery.		
Miscellaneous.		
Publicity expenses.		
Traveling.		
Expenses of promotion syndicate, including their attorneys and engineers.		
Interest on money raised by promoters.		
Premium on security bonds, employes and for franchise, etc.		

Interest.—Interest accruing on idle capital, represented either by cash or plant, during the preparation of a public utility property for service, has been repeatedly allowed by Public Service Commissions, and affirmed by the various courts, including the Supreme Court, as a proper expenditure for capitalization. The only debatable questions, in this connection, are the fair rate of interest to be allowed and the proper length of time during which the interest accrues.

"And a fair rate, usually the prevailing rate of interest, upon the money invested in the plant during the construction, and before completion, is as much a part of the cost of construction as is the money itself which is expended for material and labor."[1]

The Supreme Court of Oklahoma, in a recent decision, says regarding interest:

"The Commission refused to allow it because it did not consider it a proper element of reproductive value.

"Counsel for the Commission, however, at the oral argument before this court, conceded, and we think properly, that there was no ground for refusing its allowance. . . . . No case has been cited and in our investigation we found no case involving this question, where a reasonable amount has not been considered and allowed for loss of interest during construction as part of the cost of construction."[2]

The interest properly allowable on property held as investment during the period in which the property is being completed must not be confused with the interest allowed as a return on investment, but not earned during the early history of a corporation, which latter amount is sometimes capitalized for example, as going value, or deducted from income as a part of operating expense, where the earnings are sufficiently generous, at a later period, to permit writing off these early losses without injustice to the investors. At first thought, there may seem to be a duplication of interest in the above allowances, but the confusion arises from the use of the same term "interest" which really has two meanings, one relating to the interest involved in preparing the property for operation and therefore properly a part of construction expense the same as labor or

[1] Brunswick and Topsham Water District *vs.* Maine Water Company. 99 Maine, 371.

[2] Pioneer Telephone & Telegraph Company *vs.* Westenhaven. 118 Pacific 354.

equipment; the other relating to profit which the investor is entitled to earn upon his investment, which may or may not be charged to operation.

In making estimates for the proper allowance of interest during the construction period, it makes little difference whether it is assumed money has been put into the property at one time, when the plant was first constructed, or whether money has been added from time to time as the original plant has been enlarged. In either case interest during construction must be provided from some source. Similarly allowances must be made to cover unearned interest, that is, "unfair" return, during the early days of operation of the original plant or of added parts, as it would be a very unusual circumstance to find a utility property which began to earn a fair return as soon as the entire plant or any completed part was put in service.

The total amount of interest allowable, up to the time of beginning operation, is very often taken as the sum of two items figured separately upon:

(a) The cost of the physical plant, including the items of contractors' profit, engineering, incidentals, etc.

(b) The cost of expenditures made in cash under the head of development expenses.

The rate of interest per annum proper to allow for moneys advanced to cover necessary expenditures, during the development and construction period, will vary in different parts of the country, being determined from consideration of what money can earn from similar enterprises under like conditions and risk. In New York City, for example, 6 per cent. would not be considered an unreasonable allowance for estimating such interest, whereas in the Western States 7 or 8 per cent. would be equally as reasonable and in South American or other distant countries a still higher rate would be fair.

As equally important as the rate, in fixing the proper amount of interest allowable, is the period of time over which it is figured. The length of time estimated, depends upon the rate of construction assumed which is of course governed by the complexity of conditions under which the corporation began operation, the size and peculiarities of the plant, climatic conditions, facilities for the work, freedom from labor troubles and similar allied circumstances. The period of plant construction really extends from the time the first real estate is purchased until

the property is in condition to begin delivering output. Unless construction work is being done in large centers of population or is spread over a considerable territory, it cannot usually be advanced efficiently and economically at a rate greater than will be covered by the expenditure of about a million dollars a year for labor and ordinary material; of course the installation of large and expensive units of machinery or equipment would increase the investment rate. At the time the general electrification of surface roads was being done in New York City, and the work being pushed as rapidly as practicable, records indicate that reconstruction work did not exceed about 24 miles of single track a year as a maximum, and similiar work in Chicago has only aggregated a little over $10,000,000 a year including equipment, etc.

Where the period of plant construction is estimated to be fairly brief, as for example, less than a year, it is usually assumed that the total amount of money required will be provided in advance of beginning construction and therefore the full interest rate for the full time of construction may be allowed thereon. Where the period of construction extends over several years as in the case of large properties which cannot be built in a brief space of time without undue expense, it is quite customary to consider that all of the money is not required in advance, and to approximate conditions by considering that half of the money is required all of the time, or all of the money, half the time, so that the interest allowed is figured from the rate determined based upon half the funds provided for the whole time, or half the rate upon the total funds.

As an offset to the charge of interest during construction there may properly be considered what amount of interest the funds held waiting investment can earn. Trust Companies will pay a low rate of interest, 2 per cent. a year is quite customary, on average balances kept on deposit against a checking account. Readily convertible capital may be kept in the form of certificates of deposit on which a still higher rate may be earned. As the amount of money used during a year for construction purposes may be estimated, the average balance will be half of the amount, assuming withdrawals are made at uniform rate, consequently the amount on which interest may properly be figured whether for charges against construction or as a credit arising from earnings from bank deposits, may be fairly based on one-

half the total expenditure for the year or what amounts to the same thing, the total expenditure at one-half the rate.

A very usual rate of interest allowed, as fair and proper, has been 6 per cent. In some few instances the total amount of interest accumulating during the period of construction has been based on the amount of the investment made from month to month, but in most instances records of the progress of construction are not available and an approximate method must be used.

The New York Public Service Commission, Second District,[1] allowed 5 per cent. for two years, or a total of 10 per cent. of construction cost for interest during construction. The Commission of the First District of the same State usually allows 6 per cent. as the proper rate at which to figure interest. The Traction Valuation Commission of Chicago allowed 5 per cent. for "legal expense, carrying charges and contingencies," added to the value of the physical property which usually included 15 per cent. for engineering contingencies, etc. The Public Service Commission of St. Louis, in the Union Company Case, allowed a little over 13 per cent. of the total cost of construction expenditures, which includes real estate, incidentals and contingencies, contractors' profit and engineering. The Railroad Commission of the State of Washington has allowed 7.5 per cent. as the total interest on the cost of the physical property of the Northern Pacific Railroad, not including real estate or stores. In the Puget Sound Electric Railway decision, this same Commission allowed 7.5 per cent. upon the cost of right of way, and 3 3/4 per cent. upon construction and equipment items, to cover interest during construction. In the appraisal of the Michigan Railroads, there was allowed 3 per cent. for interest, on the entire cost of construction and equipment. The Supreme Court in the Consolidated Gas Case, upheld the Master's allowance of a total of 5 per cent. on the value of the entire plant to cover interest. The Circuit Court of Ohio in the Columbus Case, allowed about 3 per cent. of the gross replacement valuation to cover "interest and insurance" assuming that the plant would be constructed within one year. The Railroad Commission of Wisconsin has uniformly adopted the rate of 6 per cent. per annum, for interest during construction, but apparently has allowed nothing more than a total of 4 per cent. upon con-

[1] Buffalo, Rochester & Eastern, Vol. I, page 617, decided March 28, 1911.

struction expense, relatively small plants being involved in its considerations. This Commission's views, on the subject of rate of interest allowable and period of construction considered proper, are interesting.

"Respondent claimed that interest during construction should be computed at the rate of 6 per cent. That interest for such purpose is a proper item of value is indisputable. Where the plant construction is financed by borrowing, the use of such money must be paid for in form of interest. Where the corporation finances itself and no money is borrowed, an interest charge is nevertheless incurred for the money thus occupied during construction is entitled to current interest for the period so engaged. The amount to be allowed for the purpose of valuation from a theoretical standpoint at least should be at the current rate for the money from the time when financing must be arranged, directly preceding the beginning of construction, until the completion of the plant. It is not difficult to conceive of conditions under which the interest as so computed would be a very large item, since organization and franchise expenses and land purchases may be long in advance of actual construction. . . . . .

"Consideration must also be paid to the fact that the average open building season during which construction can be carried on is not in excess of six months and further that a small plant can be constructed during this period. . . . . From all facts bearing on this case a fair allowance of interest during the construction period of the plant should not exceed 4 per cent. . . . . "[1]

"The cost of interest during construction, was the subject of much testimony. The staff of the Commission used 3 per cent. under the assumption of one-year construction, but changed it to 4 per cent. because it was estimated that the construction might require more than one open season. . . . . It would seem that the interest during construction, correctly allowable in a valuation under ordinary conditions, would be interest at the current rate on the cost of each part of the plant during its construction. . . . . From the time an investment for construction is made, until the completion of the entire plant, enables that investment to become active as an integral part of a working whole, there is the element of interest for that investment is necessarily involved and is necessarily idle until the completion of the plant to a working point. The fact of interest, like the fact of depreciation, is present no matter what method be employed for the financing of it. This is as true when the money is furnished by the owners as when it is borrowed by them. The theory upon which such interest rests is sound and remains so even in isolated cases where the

[1] City of Ripon *vs.* Ripon Water Co. Decision of March 28, 1910, p. 14. Railroad Commission of Wisconsin.

investors may decide to charge no interest, and choose to donate the same to the consumers in the way of lower charges for the services rendered. Even if the Company let a contract for the complete construction of a plant to be paid for in no part until wholly completed to the operating point, interest cost would come in as a part of the contract price, even though not expressly set forth. In that case the contractor would have to ask a higher price to cover the interest cost. . . . . In the tentative valuation, the engineer of the Commission allowed 2 per cent. for various items including contingencies, omissions, liability for casualties, legal and organization expenses, etc., but in the revision allowed 3 per cent. on this account."[1]

Taxes.—"Taxes are as sure as death." They must be paid on real estate from the time of purchase, usually months or years before the beginning of construction work, also on personal property from the time of its installation, always a considerable period before such property can be used in service. Special taxes such as franchise, school, or improvements must similarly be carried until operation is begun, and usually for a considerable period thereafter, until income from operation is available for such expenses, by drawing on the funds provided for the completion of the entire property. Under ordinary circumstances there would seem to be no other convenient and legitimate way of providing for these expenditures, up to the time they can be paid as a part of regular operating expense, except to permit their capitalization.

"Mr. Floy estimates taxes at 1/2 of 1 per cent. This amount includes apparently every kind of tax from capital stock tax to franchise tax. It does not seem to be unreasonable, and except so far as it includes taxes paid in connection with the corporate organization of the old company, it should be allowed."[2]

"When the construction period ends interest and taxes may no longer be charged to construction cost. They then become charges against income and should be paid out of operating income."[3]

From the foregoing quotations and others that could be cited it will be seen that taxes accruing, at least up to the time of

[1] State Journal Printing Company *vs.* Madison Gas & Electric Company. Decision, March 8, 1910. Railroad Commission of Wisconsin.

[2] Opinion disapproving plan of reorganization. Third Avenue Railroad Company, dated July 29, 1910. Public Service Commission of New York, First District.

[3] Case No. 1273 Mayhew *vs.* Kings County Lighting Company decided October 20, 1911. Public Service Commission, New York, First District.

beginning operation, are recognized as much a necessary part of cost of construction as is the physical property itself. Knowing the local rate of taxation, capital stock tax, mortgage tax, etc., the amount of taxes properly allowable in any given case may usually be estimated very closely in figuring the cost of reproduction.

Insurance.—Like taxes and interest, insurance is a necessary part of the total cost of completing a property and practically all authorities would agree that such expenditure may properly be capitalized, certainly up to the time of beginning operation. The item of insurance, including fire, casualty, title to property and other insurance, will usually be found to aggregate a very appreciable percentage of structural cost. For example, accident insurance, protecting a corporation laying tracks in the streets of New York City, amounts to 3/4 of 1 per cent. for employees and 3/4 of 1 per cent. for the public or a total of 1.5 per cent. of the labor payrolls of the work involved. Usually estimates can quite accurately be made, depending upon local conditions and the property being reproduced, but will seldom be found to amount to less than 1/2 of 1 per cent. and possibly two or three times that amount, based on the total cost of the physical property. Public authorities have recognized the legitimacy of proper allowances for insurance, the Wisconsin Commission including it with the percentage allotted to legal and organization expenses.

Legal and Organization Expenses.—In order that any corporation, particularly a utility, may be properly and safely organized, and put on a sound basis for successful operation, conservative and reliable legal advice must be had more or less continually. While the best attorneys, like the best engineers, may make apparently large charges, such high class service usually saves utility errors and omissions which, in the end, means saving both of investment and earnings. In valuing property that has been wisely guarded and legally secured, reasonable, or what some may consider even generous allowance, must be made for legal expenses. Such allowance, in principle, has always been recognized by public authorities and courts so that the only question has been one of amount. It is of course impossible to fix a definite amount that should be allowed for all cases and it is even impossible to determine a uniform percentage, based on the costs of the remaining property, as proper for legal and organization expenses, because the services performed vary

in amount, time and value depending upon the particular property and conditions under consideration.

The Wisconsin Commission allows from 2 to 3 per cent. to cover "legal work, organization, casualty insurance, omissions and contingencies"; an amount which under ordinary city conditions would be insufficient to cover all of the items specified, but which might apply to small towns in Wisconsin. In the appraisal of the steam railroads of Michigan, 1/2 per cent. was allowed on all the property, except rolling stock, stores and supplies to cover "Legal Expenses." Similarly in the valuation of the railroads of Minnesota, 4 1/2 per cent. was allowed for "Engineering, Superintendence and Legal Expenses," as a group. The Commission of the state of Washington, in the Puget Sound case allowed 1 per cent. for "Legal and General Expenses," based on the value of the physical property not including the real estate, rolling stock or stores. The Public Service Commission of New York, Second District, allowed 5 per cent. in the Rochester Corning Elmira Traction Company decision, for "legal expenses, organization tax, tax upon stock, expenses before commissions, also marketing securities, engineering and other details." The Commission of the First District of New York has been accustomed to group legal expenses with other items, usually fixing a lump sum as proper allowance for any given company under consideration; but in one case the Commission says:

"When one comes to development charges, there is less uniformity of practice. Ordinarily these include interest and taxes during construction, preliminary legal expenses, organization expenses, fees to state and local bodies, cost of obtaining consents, etc. Opinions differ as to the proper amount to be allowed, but in the cases that have been decided by the courts and administrative bodies, the figures generally vary from 8 to 15 per cent. unless the company is able to show the exact amount spent."[1]

The Public Service Commission of St. Louis in the Union Company case, allowed 1 per cent. on the net cost of construction, not including real estate for the "Expenses of Organization," which included legal expense.

While it will be seen from the preceding that no definite and

[1] Case No. 351. Monheimer *vs.* Brooklyn Union Elevated Railroad and others. Decided March 8, 1910. Public Service Commission of New York, First District.

uniform amount or percentage can be agreed upon as always applicable, an allowance of 1 per cent. more or less, for legal and organization, in development expenses, would not ordinarily seem unfair.

Cost of Financing.—There prevails some opinion to the effect that it is improper to capitalize the difference between the par value and the cash price received for securities, the costs of brokerage, commissions, discounts or other expenditures or compensations, paid for obtaining the money that must be provided for the construction of a public utility. In view of the fact that financing is just as necessary and essential a part of the total expense of installing the physical plant or putting the property in operation, as is the cost of the structures themselves, there would seem to be no reasonable objection to such cost being capitalized, and Commissions and Courts have so held.

The Wisconsin Commission has made an allowance for the cost of financing both in condemnation and rate cases.

"The Plant in question here, for instance, was built by borrowed money or by the sale of securities which not only bear interest at 6 per cent. from the time they were issued, but which also had to be discounted at not less than 8 per cent. besides. In other words, they brought 8 per cent. less than par value in the money markets. If the plant was needed and these were the best terms upon which the capital for its construction could be obtained, it is certainly difficult to see what other disposition can be made of these charges than to include them in the cost of the plant, at least until they can be written off from earnings, if this course should be found to be advisable. For it is clear that no private party would enter a business of this kind if they had to foot such losses out of their own pockets. Such interests and discounts, therefore, often constitute a part of the price upon which the consumers must pay interest if they desire the conveniences that are offered by the utilities, because these are usually the best terms upon which such utilities can be had. These facts indicate quite clearly that the amount for which interest or discount that it may become necessary to include in the construction account, is a question that depends upon the facts in each particular case, and that it is a matter that cannot always be determined in advance." * * * *

"It is difficult to say on what grounds such discounts (on bonds) should not be included in the cost of the plant. To so include it, has been and is the almost universal practice."[1]

[1] Hill *vs.* Antigo Water Company. Decision, August 3, 1909. Railroad Commission of Wisconsin.

"The amount of $10,500.00 as discount on bonds would seem to be properly includible in the estimate of original cost of construction."[1]

"To pay expenses of the sale of the bonds hereby authorized and to make up the discount or deficiency, if any, in the amount realized from sale to net not less than 80 per cent. of par of the bonds sold for purposes specified in the sub-divisions (1) and (2) and to be applied pro rata for the purposes therein stated $97,908.00." . . . . . "That the discount and expenses in connection with the sale of any bonds authorized to be issued under this order shall be amortized out of the income of the company before January 1, 1955."[2]

"The discount . . . . . was a reasonable discount for the negotiating of bonds of that character, at the time they were sold and the amount of such discount represents actual cost to the company."[3]

Aside from the argument that capitalization should equal the value of physical property there would seem to be no particular or logical reason why the cost of financing should be hurriedly amortized. Undoubtedly it is advisable and necessary to begin writing off all costs of financing promptly and to continue to do so uniformly during the life of the bonds, so that similar expenses may be allowed when it comes time for new financing, and rates should be made high enough to permit this amortization. On the other hand, public utility corporations cannot, except in the rarest cases, make earnings in the first few years, sufficient to permit the writing-off of these costs as a part of operating expense, without either making such abnormally high rates as to retard the growth of business and place an unfair burden on the early customers or else deprive the investors of a fair and proper return on their investment.

The bond and brokerage houses, the usual medium through which an issue of securities is sold, will ordinarily charge a cash commission in addition to insisting upon having the bonds at a discount. This charge which is made to cover their expenses, advertising and some profit for their services in connection with the sale of these securities will vary from a minimum usually

[1] In the matter of the Fon du Lac Water Company decided August 19, 1910. Railroad Commission of Wisconsin.

[2] Case No. 420. In the matter of the Coney Island and Brooklyn Railroad Company, order authorizing issue of bonds, July 29, 1910, Public Service Commission of New York, First District.

[3] Report of special master, Circuit Court of the U. S. Southern District of Ohio, page 28. Columbus Railway and Light Company *vs.* City of Columbus.

not less than 2½ per cent. up to 5 or 10 per cent. depending upon the state of the financial market and the credit of the corporation desiring to place the bonds.

Moreover, in enterprises newly starting, the financiers often require a bonus in the way of stock to "sweeten" the transaction in connection with the sale of the bonds, so that the difference between the money necessary for an absolutely new company and the par value of the securities may run as high as 25 per cent. or 50 per cent. of the cash needed to complete the property.

Properties already in operation showing a fair margin of profit, two or three times the interest charges, will usually obtain money at lower cost, probably not to exceed 10 per cent.

In determining the amount fairly allowable in capitalization, for discounts on bonds, consideration must be had of the proper proportion of stock to bonds. This matter has very carefully been considered by the Public Service Commission of New York, First District, and its views set forth as follows:

"The ordinary method of raising funds must also be considered, for money can be secured by the issuance of bonds at a lower rate than stockholders demand. Other things being equal, the rate of interest which must be paid increases as the proportion of the capital raised by the issuance of bonds increases. Under ordinary circumstances, a public service corporation would be conservatively financed if one-half or two-thirds of the funds needed were secured by first mortgage bonds and the remainder by the issuance of capital stock. In a case such as the one now being considered, probably one-half of the cost of the plant could be raised by the issuance of first mortgage bonds upon a basis of from 5 to 6 per cent. As a matter of fact, the par value of the bonds of the present company is equal to the stock. It is also probable that a return of from 8 to 10 per cent. upon the stock would attract sufficient capital to provide the remainder.

"The following table illustrates the results of certain combinations of the above factors:

Case	Proportion of capital represented by bonds	Rate of return thereon	Proportion of capital represented by stock	Per cent. of return thereon	Average rate of return upon entire investment
1	1/2	6	1/2	10	8 per cent.
2	1/2	5 1/2	1/2	10	7 3/4 per cent.
3	1/2	5	1/2	9	7 per cent.
4	1/2	5	1/2	8	6 1/2 per cent.
5	2/3	6	1/3	10	7 1/3 per cent.
6	2/3	5 1/2	1/3	10	7 per cent.
7	2/3	5	1/3	9	6 1/3 per cent.
8	2/3	5	1/3	8	6 per cent.

"To illustrate, assume that the amount of money to be raised is $3,000,000, that one-half of this amount will be raised through bonds and one-half through stock, that bonds are sold upon a 5 per cent. basis, and that a 9 per cent. return is necessary to attract stockholders. The interest and dividends would be as follows:

5 per cent. interest upon the bonds (par value $1,500,000)	$ 75,000
9 per cent. dividends on stocks (face value $1,500,000)	135,000
Total interest and dividends	$210,000

"This is equivalent to 7 per cent. upon the total value of the property, assumed to be $3,000,000, as shown by Case 3."[1]

The Railroad Commission of the State of Washington held

"That safe or well-secured bonds are such as have behind them the guarantee of an independent solvent or strong road, or where the amount required would not exceed 75 per cent. of the amount invested, providing investigation shows the enterprise to be an inviting one."[2]

The Company claimed a discount should be allowed on the total cost of reproduction which the Commission refused to allow, although admitting

"all moneys, including organization cost and preliminary surveys, were covered by the issue and sale of bonds. In the judgment of the Commission such is not a financial business loan; it is financial speculation."[2]

[1] Decision of Public Service Commission, First District, June 23d, 1911, gas and electric rates charged by the Queensboro Gas and Electric Company.

[2] W. H. Paulhaumus *vs.* Puget Sound Electric Railway, Railway Commission of Washington, order Feb. 26, 1910.

The above quotations may be taken as fairly indicating the general attitude of commissions, possibly also public opinion, for the usual case, but it is not always possible to raise money on such division of stock and bonds. That such is the case has been recognized by the Public Service Commission of New York, Second District, in authorizing the issuance of bonds exclusively to pay for the construction of the Hudson River and Eastern Traction Company's electric road. The company's representatives stated, at hearings before the Commission, that subscription for stock could not be obtained, whereupon the Commission, facing the alternative of permitting the company to build the road with the proceeds derived exclusively from the sale of bonds or else preventing the construction, authorized an issue of $806,000,000 worth of bonds, par value, but expressly disavowing any responsibility to the purchaser of said bonds.

The proper discount allowable from the face value of bonds will depend upon a number of conditions such as the rate of interest they bear, the proportion of the total money invested in the enterprise to be supplied through the sale of bonds, the earnings, both present and anticipated, the character of the men associated in the enterprise, the type of enterprise itself as to location, franchises, etc., and especially upon the state of the financial market.

During the past few years the Public Service Commissions have approved the issuing of bonds at discounts varying from zero to 25 per cent. depending upon the local conditions and the corporation being considered. The Railroad Commission of Wisconsin has found it repeatedly necessary to permit the selling of bonds at not less than 75, whereas the Public Service Commission of New York State has usually fixed 85 as the minimum price, although in a number of instances authorizing the sale of bonds as low as 80. As indicating average figures it is interesting to note that the Public Service Commission of New York, Second District, reported that it had authorized in 1908 $63,000,000(000) bonds, par value, to be issued, carrying an average rate of interest of 4.29 per cent., which brought an average price of sale of 88. The same Commission, in 1909, authorized $39,000,000(000) of bonds which sold at 87.6, so that, for New York State, not including New York City, a discount of about 12 per cent. would seem to be an average figure.

Promoter's Profit.—It is difficult to appreciate why any one

should raise a question as to the propriety of compensation to the organizers or promoters of an enterprise.

The services of the promoters are in some respects like those of the engineers who design the physical property. No one denies proper compensation to the engineers for determining the kind of plant to be used and superintending its purchase and installation, but it is the organizers who conceive the undertaking, evolve the plans, promote the enterprise and supply the energy which takes the hazard and obtains the means to carry the venture through to success.

The necessity and propriety of recognizing the proper compensation for promoters who as entrepreneurs, conceive and carry out the enterprise, has been well stated in the following language:

"As already remarked, the Southern Railway is the consolidation of numerous independent railroad properties. It has become through this process of growth a great railroad system embracing to-day a mileage of more than 6000 miles. In this operation properties which were worthless have been put together to form a valuable whole. The physical condition of these properties has been enormously improved. The facilities afforded to their patrons have been increased. The whole territory involved must be benefitted by this amalgamation, so far as its physical service is concerned.

"This enterprise is a perfectly legitimate one. The men who have conceived and executed it are entitled to a fair return upon the money which has been actually invested in it. They are entitled, in addition, to a reasonable profit upon the ability to conceive and execute a project of this sort."[1]

The Railroad Securities Commission appointed only a few months ago by President Taft, recognizes the appropriateness and legality of the promoters' profits in the following words:

"We are told that the profit of the promoter represents a wholly unnecessary burden upon the American public, and that so far as this profit can be done away with, it will be good for all parties. Neither of these statements is quite true. The promoters, using the term in a broad sense, may be divided into two classes; constructors who build a road whose future is uncertain, in the expectation of selling the stock for more than it cost them; and financiers who induce the public to buy the bonds of such roads. Both of these classes, if they do their work honestly, render useful services to the public. The constructor gives our undeveloped districts the benefit of new roads, which they

[1] City of Danville *et al. vs.* Southern Railway Company *et al.*, 81 C. C. R. 409, page 438.

would not get without his intervention; and if he does his business well he builds the roads more economically than anybody could. The financier renders an equally important service in collecting the capital of the investors to build new railroads or improve old ones. On the Continent of Europe this is done by the banks. The great banking concerns of Germany use a very considerable part of their deposits in carrying industrial enterprises during their initial stages before their merits have been demonstrated, and then disposing of them to the actual investor at a profit in order to set their capital free for the floating of new concerns. But in the United States the power of the banks to do this is limited by law and by custom; and so far as they either cannot or do not, it must be done by financial houses especially organized for the purpose.

"Our American system undoubtedly involves grave possibilities of fraud. The man who is constructing a road is tempted to persuade people to loan him money on inadequate security. The financiers may be tempted to wink at this deception. Worst of all, the roads thus built may be built for sale at an inflated valuation. The promoter may obtain his profit, not from the legitimate increase of the value of the property, but from his power to persuade the management of some larger system to buy the branch road for more than it is really worth. These are evils which publicity would do much to check. Where there is no fraud, the promoter renders a service for which he is entitled to fair remuneration."[1]

It is not always easy to determine the exact value of the promoters' services. It has been argued that a uniform percentage of the value of the physical investment should be taken as the compensation due the promoter, as for example, the allowance of five per cent. by the Public Service Commission of New York, Second District, in the Rochester, Corning and Elmira Traction Company decision. But, where possible, probably a fairer method is to ascertain for each particular case, an approximation of the value of the services rendered by ascertaining how long the promoter has been engaged in the work, what he has accomplished and what his expenses have been. This method usually results in the allowance of a lump sum and has been recognized in decisions of the New York and Wisconsin Public Service Commissions. While it should be acknowledged that men of character and standing are engaged in the promotion of enterprises and that their services are entitled to a legitimate return; that does not mean, however, any recog-

[1] Report of the Railroad Securities Commission to the President, November, 1911, page 32.

nition of effort to exploit and promote corporations that are illegitimate or bankrupt.

What has sometimes facetiously been referred to as "Water" in the securities of a corporation, is really nothing more than an unfairly large promoters' profit. To the extent that "Water" properly and honestly represents the cost of promoting an enterprise, its recognition in capitalization is perfectly right and proper as without encouragement and remuneration, no enterprise involving risk will be undertaken.

Working Capital.—From the time the actual promotion of a corporation begins, continuing during the period of construction and down into and through its existence as an operating entity, available cash in hand, beyond that required to meet predetermined expenditures, is essential to success. To anyone who has had practical experience in operating a utility corporation, it is unthinkable that a reasonable amount of working capital, that is, cash in bank, should not be provided as a part of the property. The working capital, a fund available as a surge tank, provides not alone for the payment of operating expenses as they accrue, permits taking advantage of cash discounts, affords the all essential in case of emergency, but as much as anything else, maintains the general credit and efficiency of the organization. A company that does not ordinarily keep to its credit in the bank, a cash balance, bearing some proper relation to its business transactions, cannot hope to obtain accommodation in the way of temporary loans or discounts. Moreover, no one thing as thoroughly reduces the efficiency of any organization, from the highest official down, as to be compelled to await collections, instead of having a cash fund from which to meet obligations.

The reasonableness of the foregoing has been widely recognized and the legality of maintaining sufficient working capital, cash, materials and supplies, has been fully sustained.

"That phrase (working capital) means the amount of cash necessary for the safe and convenient transaction of a business, having regard to the owner's ordinary outstandings, both payable and receivable; the ordinary condition of his stock or supplies in hand; the natural risk of his business, and the condition of his credit; and unless these matters and perhaps others, be looked into no comparison can be drawn between one business and another, or even between those of the same general nature."[1]

[1] Consolidated Gas Company *vs.* City of New York, Judge Hough, Circuit Court of the U. S., Southern District of New York, page 13.

"A gas company must purchase material and supplies, must pay its employees and must distribute its commodity to consumers in advance of such service. This requires a fund ordinarily called working capital. It is reimbursed from operating receipts from time to time, but originally is provided from capital. The amount needed depends on the advances that must be made and the period for which they must be carried."[1]

In the case of Queens Borough Gas and Electric Company the commission allowed 3.7 per cent. on the present value of the complete property of the electric plant and 6.2 per cent. on the present value of the complete gas plant for working capital.

"When considering working capital it is not necessary to provide for taxes, interest, dividends, and other fixed charges of a similar nature. These are paid from operating income and not from capital."[2]

"However, it does seem proper to provide for materials and supplies to meet repairs and renewals promptly."[1]

In this case the Commission allowed 3.75 per cent. on the present value of the property complete, for working capital.

"For a company so situated as the one in question here, the essential items in working capital would seem to consist of stocks and supplies and cash on hand.

"Regarding the method of estimating the amount required for working capital there was some variance in the testimony. One witness said that frequently one-third of the yearly receipts was adopted to estimate the amount of working capital, but that in actual business it was estimated by trial and error. The relation between fixed and quick assets, witness stated, varies with the size of the plant, being larger in a small plant because the large company is better able to handle finances. Remarking that no general rule would be applicable, without adjustment, to determine the amount of working capital which should be allowed, this witness said he had found that in this case 10 per cent. of the total capitalization should be kept liquid. Witness mentioned another basis for determining a fair working capital for gas business, viz., according to a certain number of cents per 1,000 cu. ft. of gas sold, but later qualified his testimony by stating

[1] Case No. 1273 Mayhew *vs.* Kings County Lighting Company. Decision dated October 20, 1911. Also in the matter of the Queens Borough Gas and Electric Company. Decision dated June 23, 1911. Public Service Commission of New York, First District.

[2] Case No. 1273 Mayhew *vs.* Kings County Lighting Company. Decision dated October 20, 1911. Public Service Commission of New York, First District.

that this is not as good a method because the sales continually vary. Witness had used 20 cents per 1,000 ft. and sometimes 30 cents. He considered 30 cents reasonable under general conditions, but admitted that in a large company a less rate would be sufficient. He thought 30 cents to be a fairly reasonable figure to be used in a company of the size of that in this case.

"Another witness declared that he considered the working capital to consist of the difference between the quick assets and liabilities when the former were the greatest. That is, the working capital consists of the amount by which the current or quick assets, as distinguished from quick assets, exceeds the sum of the current or quick liabilities, as distinguished from the fixed liabilities. This is no doubt true, but these facts show the existing condition of a plant in this respect rather than the amount that is actually required for working capital." * * * * *

"These facts are significant. They show that the company is in a position where it is practicable for it to meet at least the greater proportion of its current outlays, from its current receipts, or to meet these outlays on a basis that is practically the equivalent of cash transactions. . . . . In fact it appears to us that a working capital of even less than 15 per cent. of the amount derived from the sales of the gas and current, or, of from $45,000 to $50,000 is fully adequate under present conditions."[1]

Non-Existent Property.—A study of the history of each utility property being appraised is necessary in order to ascertain whether expenditures have been made in the past for physical plant of which no evidence longer exists. Public opinion, city ordinance, state legislation, inadequacy or obsolescence may have caused the abandonment of property before it was worn out, the cost of which, where determinable, less scrap or salvage value must be considered as one of the expenses involved in bringing the property to its present state of adequacy and efficiency. This cost, or as much of the same as is proper, must be allowed as an intangible value to be included as one of the items of capitalization either among Development Expenses, or as Going Value unless earnings have been sufficient to permit, without injustice to the holders of securities, the writing off of the whole or a part of such cost, in which latter case only the remaining balance is applicable for capitalization.

[1] State Journal Printing Company *vs.* Madison Gas & Electric Company Decision, March 8, 1910. Railroad Commission of Wisconsin.

"I am further satisfied that this amount (reproduction value) is not the true measure of the value of the investment in the enterprise. It leaves out of consideration any allowance for necessary and reasonable investment and purchase of the old lines and equipments, which were indispensable to the completed improvement, but of which a large part was of such nature that it does not count in the final inventory."[1]

In making a valuation, it is necessary to consider the local conditions under which the physical plant being appraised, was installed. In order to accommodate the public, avoid the accumulation of overhead expenses and to permit the early beginning of operating income, it is frequently advisable to expend considerable amounts of money for temporary structures, work or apparatus. For example, in changing over the cable roads to electricity in New York City, inexpensive, inefficient, electric generating units were installed, synchronous converters, to be used later in connection with a central power plant, were temporarily set up and belted to the old cable engines and used to furnish energy until the power-house was completed. In connection with the construction of water works in the new town of Gary, Indiana, it was found necessary, in order to accommodate the public, to install temporary mains and connections, afterward replaced by permanent construction which gave no indication of the temporary work, the expense of which was a necessary part of the cost of the completed property. The necessity for change of plan in the construction of the last Croton dam, by the City of New York, involving an outlay estimated at over $1,000,000 for which there is nothing to show in the cost of reproduction of the present physical plant, the unexpected accident in the boring of the Loetschberg tunnel in Switzerland, which required the abandoning of a costly part of the work and diversion of the original line, the failure of the Quebec bridge, now being built, are but typical examples of what might be cited to show that without any necessary error or negligence, expenditures have been made without the accomplishment of any tangible result, the cost of which must be fairly considered in determining reproduction values.

[1] Milwaukee Electric Railway and Light Company *vs.* City of Milwaukee, 87 Fed. 585.

CHAPTER VII

FRANCHISES, GOOD WILL, GOING VALUE, CONTRACTS

Franchises.—Among the earliest efforts to fix intangible values accruing to utility properties, was the attempted evaluation of franchises. During the past years, various methods and bases of appraising franchises have been evolved, but few are worthy of serious consideration, or can be accepted in any way as standard. The present-day tendency, undoubtedly, seeks to, and in fact the laws of some states actually do, prohibit the capitalization of franchises beyond the actual cash expended, in good faith, in obtaining them from proper public authorities. Nevertheless it is and has been generally recognized that certain vested rights may accrue to franchises, of which the owners may not be deprived.

"Private citizens may acquire vested property rights through a series of even erroneous decisions; rights so firmly vested that it becomes unconstitutional for the court which persisted in error suddenly to rectify its mistakes to the detriment of those who had securely rested upon the decisions sought to be invalidated."[1]

Although disinclined to allow any value accruing to franchises, aside from that in the plant itself, the Supreme Court, recognizing the fact that the New York State Legislature had acquiesced in the capitalization of the franchise of the Consolidated Gas Company, allowed, in round numbers, $7,500,000.00 expressly for franchise, reducing to that amount the allowance of the lower court, of $12,000,000.00, adding by way of explaining its refusal to recognize any increase over the original amount:

"But although the state ought for these reasons (applicable to this case—not general) to be bound to recognize the value agreed upon in 1884 as part of the property upon which a reasonable return can be demanded, we do not think an increase in that valuation ought to be allowed upon the theory suggested by the Court below. Because the amount of gas supplied has increased to the extent stated, and the

[1] Consolidated Gas Case *vs.* City of New York, 157 Fed. 878.

other and tangible property of the corporations has increased so largely in value, is not, as it seems to us, any reason for attributing a like proportional increase in the value of the franchises. Real estate may have increased in value very largely, as also the personal property, without any necessary increase in the value of the franchises. Its past value was founded upon the opportunity of obtaining these enormous and excessive returns upon the property of the company, without legislative interference with the price for the supply of gas, but that immunity for the future was, of course, uncertain, and the moment it ceased and the legislature reduced the earnings to a reasonable sum, the great value of the franchises would be at once and unfavorably affected, but how much so it is not possible for us to see. The value would most certainly not increase."

"What has been said herein regarding the value of the franchises in this case has been necessarily founded upon its own peculiar facts, and the decision can form no precedent in regard to the valuation of franchises generally where the facts are not similar to those in the case before us."[1]

Probably one of the clearest expositions of the present attitude of mind of public authorities and the courts, as to the values of franchises, has been expressed by the Federal Court as follows:

"Should a corporation have a right to demand an income return, separable from any return upon its tangible property, from its right to place gas mains in the public streets and maintain them for its private profit, a right which it did not buy from city or state or pay therefor any legal valuable consideration? The Court thinks not, because 'Return can be expected only from investment, and he that invests must part with something in the act of investing.' Does any company invest its franchise in its business? It does not part with its franchise in the same way it parted with money or money's worth in acquiring or creating mains or plants. The investment of property was made, not in the franchise, but under the franchise, and on the faith thereof. The franchise is but a part of the power of sovereignty, allotted to a private person for the benefit of all, and only incidentally given for private emoluments.

"What is the value of a franchise to perform a certain service, under which no money is invested and no service yet performed? What is it worth apart from performance under it?

"Unless it can be seen to possess inherent value entirely apart from the earning capacity of the subsequent investment or from the actual earnings resulting from such investment, the value asserted or claimed

[1] Wilcox *vs.* Consolidated Gas Company, 212 U. S. 47.

is but a duplication of that derived from the use of the tangible property when so invested.

"The concepts of the nature and value of franchises are seen dimly and confusedly because of the failure to distinguish between productive and non-productive property. Land, money, chattels may by industry and intelligence be made productive without a franchise; but no excellence in these desirable qualities can ultimately render a franchise productive without the use of money, chattels, and land in connection therewith, and when the juncture is made the earning capacity of the real and personal property, plus the franchise and plus intelligence and industry, is really no greater than it would be without the franchise, for the franchise has added no producing power to the realty or personality; it has but authorized their employment in a particular way and protected the owners while so employing them.

"I can imagine no more than three ways in which the value of a franchise can be stated. It is valuable: (1) because it authorizes the gainful use of private property in a particular manner; (2) because once obtained it is often difficult or impossible to get another like it; (3) because it may be used to injure or hinder another enterprise, although itself conferring or securing nothing of value.

"The third method of statement has been accurately, though colloquially, described as a 'nuisance value,' and is so obviously illegitimate as to require no discussion. The second method of statement, when carefully considered, asserts that because the sovereign has deemed it advisable to entrust a public work to one citizen or a body of citizens such quasi monopolistic grant confers the right to charge for the service more than would be just or lawful were the occupation open to all. Nor does it change the truth of the last statement that the difficulty of procuring franchises produces, and long has produced, a traffic in them. On every private sale of franchise property, the price paid is so much money lost to the public by official incompetence or worse, and such sale can confer on the vendee no right to compel the consumer to repay him a price that should have been paid to the State. For these reasons, I believe that on principle a franchise should be held to have no value except that arising from its use as a shield to protect those investing their property on the faith thereof, and that, considered alone and apart from the property which it renders fruitful, it possesses no more economic value, for the investor, than does an actual shield possess fighting value apart from the soldier who bears it."[1]

Judge R. W. Tayler of the United States Circuit Court as arbitrator of the recent controversy between the city of Cleveland and the local Street Railway Company, recognized franchise value and allowed the company $3,615,844 for the value of its

[1] Consolidated Gas Case, 157 Fed., page 872.

franchise. Judge Tayler obtained this value by capitalizing the money the company was able to earn over 5 3/4 per cent. allowed as the proper return, on the physical value. Other and important cases could be cited, such as the settlement with the Chicago Traction Companies, the Michigan appraisal of the steam railroads, etc., where substantial allowances have been made in capitalization for franchises.

It has been argued that a franchise, being a gift from the people, should not be capitalized against the people and they be compelled to pay a return thereon. On the other hand, during the earlier days, under other than existing conditions, franchises, recognized as valuable privileges which it would not be necessary or proper to grant to-day, where given as inducements for the investment of capital and expenditure of effort, with the assumption of obligations still binding.

The objections to the perpetual franchise, as concerns the public, have been recognized and appreciated for many years, so that while desired by corporations, perpetual franchises are seldom or never granted at present, consequently their valuation is most difficult of ascertainment on any basis, cost of reproduction, commercial value, or original cost. Regardless of the difficulties in the case, an appraisal must consider the business contract entered into when the franchise was granted.

In many instances it will be found that a corporation has extended its service in advance of demand, relying upon future growth of the business, with accompanying profits, to compensate for initial losses. If these losses have not been made good, their capitalization may represent what has been called franchise value, but more usually going value.

Where investors have shown business acumen and good judgment in entering unexploited territory, obtaining concessions which have been made the basis of investment and enterprise, such basis should logically and legally be recognized in ascertaining the fair value of the property being appraised. To illustrate one of the street railway companies, operating in greater New York, years ago obtained a franchise under which it was relieved from any obligation to maintain and repair street pavements within and adjoining its tracks. The annual saving, resulting from such valuable franchise granted in return for certain obligations assumed by the company, enables the latter to show relatively larger net earnings than its competitors; consequently the

property is worth more to its owners. This value might be recognized and some allowance made therefor, regardless of the fact that in case of a new company being granted a franchise of the same character at present, it would not be allowed to capitalize or permitted to earn profits on such franchise.

Less valuable to the corporations than perpetual franchises, are what have been termed "limited" or "short term" franchises, granted for a specified term, usually varying from 10 to 50 years. While such form of franchises have fewer objectionable features, as related to the public, than perpetual franchises, all proper capitalization of short term franchises as well as the expenses involved in obtaining them, must be amortised at the expense of the public, during the terms of the franchises. The valuation of a limited term franchise is more easily made than a perpetual franchise, the former usually not being of great value, aside from the permission to transact business unless an attempt is made to determine the value of a limited franchise, by capitalizing the net earnings. But, as in the case of a perpetual franchise, any such method of evaluation must be based on the assumption that the rates being charged are fair and reasonable as regards the total fair value of the property.

Franchises have been appraised in some instances, by attempting to determine in a general way their relation to the appraised value of the physical plant. The figures used would seem to be derived from a study of the net earnings of utility corporations, and primarily established through a capitalization of such earnings. A fairly common figure that has been used, is 33 1/3 per cent., that is, the value of the physical plant is ascertained, and 33 1/3 per cent. of the same, taken to represent the value of the franchise, is added to the physical plant, which gives the total appraised value. An examination of values placed on many franchises in the past for purposes of taxation, capitalization, condemnation, and court decisions, will indicate that perhaps an average valuation in such cases, is not far from one-third of the total replacement value of the corporations' assets. This ratio though arbitrarily assumed, and an approximate method, seems to be about the only method which has had any general acceptance, aside from directly capitalizing the net earnings.

In the state appraisal of the Michigan railroads, Prof. H. C. Adams evolved a theory of "immaterial properties," or what has been called "franchise" valuation, which consisted in brief of

capitalizing the remainder of net income, after deducting all operating expenses, and a fair rate of interest on the value of the physical property.

Prof. Adams has explained his rule as follows:

"Sixth. The rule submitted for the appraisal of the immaterial values of railway properties, or what I prefer to term the capitalization of corporate organization and business opportunity, is simple, as follows:

"1. Begin with gross earnings from operation, deduct therefrom the aggregate of operating expenses, and the remainder may be termed the 'income from operation.' To this should be added 'income from corporate investments,' giving a sum which may be termed 'total income,' and which represents the amount at the disposal of the corporation for the support of its capital and for the determination of its annual surplus.

"2. Deduct from the above amount, that is to say, total income, as an annuity properly chargeable to capital, a certain per cent. of the appraised value of the physical properties.

"3. From this amount should be deducted taxes,[1] rents paid for the lease of property operated, provided such property is not covered by the physical valuation made the basis of the annuity referred to under paragraph 2, and permanent improvements charged directly to income. The remainder would represent the surplus which, capitalized at a certain rate of interest, gives the value of immaterial properties.[2]

"The nature of the rule presented above may be seen more clearly from the blank form next presented, being the form to which the accounts of each railroad were reduced preparatory to compilation."

[1] The Michigan system of railway accounts prescribed by the railroad commissioner includes taxes in "operating expenses," and for the purpose of this analysis such inclusion may be accepted.

[2] Extract from letter of Henry C. Adams, dated at Ann Arbor, October, 1900, to the Board of State Tax Commissioners, Lansing, Mich., containing rule for computing intangible values of railway corporations.

FORM OF COMPILATION

Name of road.....

Statement showing computation of the value of the non-physical elements of the above-named road, whose physical elements were, on November 1, 1900, officially appraised at $.....

Average statement for.....years ending.....

Items	Item	Amounts for entire system	Per mile operated	Amounts apportioned to Michigan
Number of miles operated.....				
Gross income from operation...	$.....	$.....	$.....	$.....
Operating expenses, exclusive of taxes.....				
Net income from operation....				
Net income from investments..				
Total available corporate income.....				
Annuity deducted for capital at 4 per cent. of the mean value of physical elements.....				
Remainder available for other purposes.....				
Further deductions:				
1. Taxes on physical elements at 1 per cent. of mean value.....				
2. Rentals on property not covered by appraisal....				
3. Interest on current liabilities.....				
4. Permanent improvements charged to income.....				
Total further deductions..				
Surplus.....				
Deficit.....				
Capitalization of surplus at 7 per cent. which results in a value of non-physical elements such that it yields a net income of 6 per cent. after payment of a tax of 1 per cent.....				$..... [1]

[1] Bureau of the Census, *Bulletin* No. 21.

A similar method was used by Prof. Adams in valuing the franchises of the traction companies in Chicago, used as a basis of settlement of their controversy with the city. In Chicago, the net earnings were determined by deducting all operating expenses, maintenance, renewal charges and taxes, from gross receipts, thus obtaining a net income from which interest at a fair rate, on the value of the physical plant, was deducted. The amount of net income remaining after this deduction represented the value of the franchise in question, by capitalization.

The franchise tax commissioners in New York State, in determining the value on which to assess the special franchise tax, as far as their methods are disclosed, first appraise the physical plant in the streets or on other public property, adding the capitalization of net earnings at 2 to 5 per cent., depending on the class to which the city belongs, thus obtaining what is called an assessed value on which the tax is computed.

"The method of assessment followed in practice is to ascertain the value of all tangible property of a given corporation, and the amount of its net earnings, allot to the tangible property a fair return out of earnings, and capitalize the residue thereof, if any, at the same fair rate to ascertain the value of the special franchise. This is undoubtedly an easy and convenient method of affixing the tax, but as a scientific method of ascertaining the value of the franchise it is open to the obvious objection that as long as the tangible property earns anything, and the franchise exists, the franchise contributes to the earning power, because it is only by virtue of the franchise that anything at all is earned. Again, as a method of valuation allied not to taxation, but to rate regulation, the system is reducible to an absurdity; for at what point of time is the inquiry to be made? Clearly before the reduced rate goes into effect. Yet by this method, since the fair rate of return upon tangible property is a constant figure, the capitalization of the residue at the same figure will always give a valuation for the franchise, rendering reduction impossible."[1]

In New York State the Public Service Commissioners are prohibited, by the law which created them, from allowing any value for franchises beyond the actual expense made in good faith in obtaining them. In their decisions, the Commissions have taken the position that this applies as well to corporations in existence before the creation of the commissions, as well as to corporations

[1] Consolidated Gas Company *vs.* City of New York. 157 Fed. 877.

which have commenced business since that time in accordance with the public service law.

In an attempt to evolve a form of franchise which will encourage the investment of capital and efficient utility service without inuring to the damage of the public, through loss of control and regulation, the indeterminate franchise has been proposed. The indeterminate franchise in its most perfected form has been developed in the state of Wisconsin, where legislative enactment has been made to compel the utilities to accept indeterminate franchises. The theory of the indeterminate franchise which has been called "the right of a corporation to exercise its duties during good behavior," is that public interest shall have the right to terminate a franchise whenever the public may so determine; the only qualification being that at the time of taking, compensation for the property of a corporation shall be paid. In Wisconsin the amount of this compensation is to be determined by the Railroad Commission of the State. A modified and simpler form of indeterminate franchise has existed in Massachusetts for some years. The traction companies in Chicago are at present operating under what may be called a form of indeterminate franchise. In Washington, D. C., Porto Rico, and the Philippines, Congress has granted only a form of franchise which permits of its alteration, amendment or repeal, at the option of Congress.

It is almost unnecessary to state that the value of an indeterminate franchise in case of appraisal would be only the actual cash cost of obtaining same.

Good Will.—The natural tendency in appraising intangible values is to group them and endeavor to fix a given amount as covering the whole. Such treatment may seem an easy solution of a complex and difficult problem, but can hardly be considered logical or scientific.

One of the common meanings of "going value" as applied to the intangible value of utility property, namely the capitalization of the net return, could be applied as a very satisfactory definition of the "good will" of an industrial enterprise. The present-day opinion, both of the public and its officials, leans toward a minimizing or entire negligence of any value of good will accruing to a public utility property. This attitude of mind, however, is not wholly fair. Competition, in many instances, does exist between public utility properties. For example, street railway companies,

operating on parallel avenues, or in competition with elevated roads or subways on the same avenues, cannot be considered monopolies. A splendid illustration of the value of the public good will is evidenced by the large increase and steady growth of the earnings of the Third Avenue Street Railway system in New York City, after the property was put in good physical condition by the receiver. In the same way, if the gas and electric utilities are separately owned and operated in a given town, there is always competition for the lighting business, the income from which will be determined in part by the relative amount of good will possessed by the respective companies. How to evaluate such good will is most difficult, and no scientific method has yet been suggested, aside from its inclusion in going value.

"That kind of good will, as suggested in Wilcox *vs.* Consolidated Gas Co. 212 U. S. 19, is of little or no commercial value when the business is, as here, a natural monopoly with which the customer must deal, whether he will or not."[1]

"We are also of the opinion that it is not a case for a valuation of good will . . . . . the complainant has a monopoly in fact, and a consumer must take gas from it, or go without. He will resort to the "old stand" because he cannot get gas anywhere else. The Court below excluded that item, and we concur in that action."[2]

Judge Tayler in arbitrating the Cleveland Traction controversy, in which settlement no allowance whatever for good will was made, explained his views as follows:

"I allow nothing for good will. A street railway company which has a monopoly, and especially if it has a franchise value remaining, can have no good will value."

The Wisconsin Commission has followed the prevailing opinion of the Courts with regard to good will, saying:

"There may be an element of good will in the business of a public service corporation where competition exists and the public may resort to more than one public utility for the desired service, but where the public is confined to a single public utility for the service the latter undertakes, it would seem that there is no ground upon which good will can be predicated."[3]

[1] Omaha *vs.* Omaha Water Co. 118 U. S. 202.

[2] Wilcox, *vs.* U. S. Consolidated Gas Co. 212 U. S., page 17.

[3] In fixing just compensation to be paid to the Cashton Light and Power Company, decided Nov. 28, 1908. Railroad Commission of Wisconsin.

Good will as here defined probably has no existence separated from or apart from the franchise which permits the earnings to be capitalized.

As indicating the variable and indefinite value attaching to good will, the following opinions of courts are valuable:

"A monopoly has no good will, for its customers are retained by compulsion, not by their voluntary choice."[1]

"But the term 'good will' may be misleading. Lord Eldon said that 'good will' is nothing more than the probability that the old customers will resort to the old place. Cruttwell *vs.* Lye, 17 Ves. Jr. 335. . . . . Under any possible definition it involves an element of personal choice. This phrase is inappropriate where there can be no choice. So far as the defendant's system is 'practically exclusive,' the element of 'good will' should not be considered."[2]

Going Value.—Going value, or going concern value, like the term "depreciation," must be explained, or qualified to make its meaning clear. It is closely allied to good will, but the courts are inclined to distinguish between the two; ascribing good will to competitive enterprises, and going value to monopolies. To attain any appreciable value, both going value and good will require the lapse of a considerable time, and they are usually the result of the expenditure of effort or investment, or both.

Several methods have been used, and more theories suggested for evaluating going value, but no generally accepted rule of procedure has yet been determined. It is probable that there must be considerable further evolution of the subject before any particular method can be generally agreed upon, as suitable and applicable for all cases.

While going value may be a vague term capable of considerable variation in meaning, nevertheless, however defined, it is used in connection with, or based on considerations of property income.

Four separate interpretations of going value will be discussed, with some reference to court decisions.

First.—A legal and economic, recognized value, usually determined, in an approximate way, in addition to, and over and above the value of the physical plant, resulting from the putting of said plant into actual and useful operation. The value

[1] Bristol *vs.* Bristol Water Works, 23 R. I. 278.

[2] Kennebec Water Dist. *vs.* Waterville, 97 Me. 185; 60 L. R. A. 868.

may be based on merely an actual expenditure in dollars, or an estimated value indicating the worth of the service performed, in transforming the "dead" into a "live" income producing property. This latter meaning is not the same as "promoters' profit," but is akin to it, and both services have undoubtedly been taken together and grouped as one going value in certain judicial decisions. This use of the term "going value" in connection with the expense of putting an organization in "motion" is generally acknowledged and recognized as a proper expenditure to be included as a part of the capitalization.

It may represent values above the actual cost of procuring certain elements, the financial outlay for which may have been included as a part of operating expense, but the knowledge and experience now in hand is a distinct asset, apart from the cash cost. Among the elements referred to, may be mentioned cooperation of employees, public officials, a clientèle resulting from courteous treatment and fair dealing; data as a result of test and experimentation, organization which precludes displacing all employees in case of a change in management because such displacement would necessitate the building up of a new organization at the expense of the public; financial standing which enables a corporation to obtain better prices than the average.

In at least one instance 27 per cent. of the appraised value of the physical plant has been proposed as determining the proper ratio of going value to physical value. Experts in appraisal of waterworks and gas-plants have proposed a certain fixed sum per connected customer; in one case this figure was fixed at $30.00 as a proper though arbitrary basis for determining going value.

Another proposal favored by experts of standing and ability is to take one-half or even the whole of the amount of present, annual gross income as the measure of going value, perhaps unconsciously adopting such basis because of a knowledge of the cost of getting a corporation fully running after completion of the physical plant.

Justice Moody, of the Supreme Court, referring to "going concern" in the Knoxville Water Company rate case, and mentioning the value of the physical plant to which was added $10,000.00 for "organization promotion, etc., and $60,000.00 for "going concern," a total sum of $70,000.00, says:

"The latter sum we understand to be an expression of the added value of the plant as a whole, over the sum of the values of its component

parts, which is attached to it because it is in active and successful operation, and earning a return. We express no opinion as to the propriety of including these two items in the valuation of the plant for the purpose for which it is valued in this case, but leave that question to be considered when it necessarily arises. We assume, without deciding, that these items were properly added in this case." [1]

In the Omaha case which involved the value of a system of waterworks under a contract for its purchase by the city, the Court sustained an allowance by the appraisers for "going value," saying:

"The appraisers in making up their estimate of valuation included $562,712.45 for going value. . . . . .

"The value in equity and justice must include whatever is contributed by the fact of the connection of the items making a complete and operating plant. The difference between a dead plant and a live one is a real value, and is independent of any franchise to go on, or any mere good will as between such a plant and its customers." [2]

In reviewing a decision of the Texas Railroad Commission, the Circuit Court said:

"The Commission states that in estimating the value of these roads they included interest on the money invested during the period of construction. This is somewhat vague, but the 'period of construction' mentioned is probably limited to the time when each section of the road was opened to the public for business. And even if extended to the time when the road was completed to Denison and to Austin in 1873, nearly twenty years after its construction was begun at Houston, it would not cover all of the time and possibly not nearly all of the time in which the railroad company and its predecessors have lost interest in the investment." [3]

Reference should also be made to the recent decision of Judge Hook, in which he says:

"An established railroad system may be worth more than its original cost and more than the mere cost of its physical reproduction. It has passed the initial period of little or no return to its owners which, of greater or less duration, almost always follows construction, and is not infrequently marked by default and bankruptcy. The inevitable errors in its building which finite minds and hands cannot avoid have been measurably corrected, time and effort have produced a commercial

[1] City of Knoxville *vs.* Knoxville Water Company, 212 U. S. 1.

[2] Omaha *vs.* Omaha Water Company, 118 U. S. 202.

[3] Metropolitan Trust Co. *vs.* Houston & T. C. R. R. Co. 90 Fed. 683.

adjustment between it and the country it was intended to serve, relations have been established with patrons, and sources of traffic have been opened up and made tributary. In other words, the railroad, unlike one newly constructed, is fully equipped and is doing business as a going concern. It has attained a position after many experiences common to railroad enterprises which entail loss and cost not paid from current earnings and which correspondingly make for value."[1]

As throwing further light on the total value of the property of an active going corporation, the decision of the Privy Council of England in the case of appeal from the Supreme Court of New Zealand[2] is particularly pertinent. The City of Hamilton decided

"to purchase the gas works and plant at a price to be determined by arbitration"

from the local company under the franchise agreement. Arbitrators were appointed and they made two valuations, one covering merely the physical plant and the second including a value for going concern. The city contended the lower value should be accepted, while the company claimed that under proper interpretation of the wording in the franchise agreement they were entitled to remuneration for their property as a going concern. The matter was carried through the various Courts of New Zealand and finally brought to the Supreme Court of the Kingdom, the Privy Council of England, which held that the true interpretation of the clause quoted above was

"the price to be paid for the said gas works and plants should be the commercial value thereof as a going concern and not merely their structural value."

The Privy Council called attention to the fact that under certain decisions previously rendered in England, awards had been made in cases of purchase, merely on the basis of the price for physical property, but in those cases the basis of valuation had been clearly defined in the franchise provisions, whereas in the Hamilton case, if physical property only had been intended to be purchased,

"such limitation should plainly and could easily have been made in language which would have excluded every monopoly, good will, or

[1] M. K. & T. Ry. Co. *vs.* Love 177 Fed. 493.

[2] Hamilton Gas Company, Ltd., *vs.* Mayor, Councillors and Burgesses of the Borough of Hamilton, 1910, App. Cas. 300.

undertaking, as such, from being included within the term 'gas works and plant' employed."[1]

The position taken in the above case, by the Privy Council, was reaffirmed in a decision rendered last year, in the matter of the appeal of the City of Perth, with regard to the value of the Perth Gas Company's plant, which the city was purchasing. The question was whether the purchase price should be based on the value of the physical property, or this thing, plus the value as a "going commercial concern," the Privy Council holding that

"in the absence of an express provision to the contrary, the transaction which it contemplates, is the sale and transfer, with the consent of the encumbrancers to the respondents of the appellants' commercial undertaking as a going concern; not only of the physical apparatus by which they carry on their business, but also of their statutory powers; and that the whole must be included in the calculation of the purchase money."[2]

Sometimes the courts of America have taken going value as to include any value that may accrue by reason of good will or franchises, but in other cases have expressly stated that these other items were not included.

Second.—A very frequent use of the term "going value" is that of "capitalized losses," namely, the capitalization of losses incurred during the first few years after a corporation begins business. With comparatively few corporations has it been found that from the moment construction of the physical plant is complete and operation begins, the gross income will be sufficient to provide, not alone the cost of operating the property, but in addition fixed charges, taxes and a fair return on the investment. There is usually a formative period with every corporation, which may extend over a few months, or a considerable number of years, during which time, expenses, due possibly to operation or probably by reason of the necessity of providing for depreciation, and certainly to cover more or less of the fixed charges; and a fair return on the investment must be furnished from other sources until the gross income is sufficient therefor. This expense, cost or charge has been recognized, both by the courts and public service commissions, as being as much a part of the total sum going to make up the fair value of corporation

[1] Hamilton Gas Company, Ltd., *vs.* Mayor, Councillors and Burgesses of the Borough of Hamilton, 1910, App. Cas. 300.

[2] Perth Gas Company, Ltd., *vs.* Mayor and Councillors of the City of Perth. Law Reports, Aug. 1, 1911, part 3, page 506.

property, as is the physical plant, and therefor equally proper for capitalization. Some authorities, while recognizing that early losses are apt to occur in the starting of any corporation, conclude that such losses are not properly a part of capital, but should be considered a part of operating expense, to be made good by allowing somewhat larger earnings at a later period.

The Wisconsin Public Service Commission in many of its decisions has estimated and allowed the worth of going value in connection with ascertaining the reproduction cost of a total property. The method in brief is to consider the operating deficits accruing through building up a business to a point where the gross income is sufficient to cover normal operating expenses, maintenance, fixed charges, depreciation and profit. Its basis of reasoning has been most fully set forth in its well-known Antigo Water Case decision and order, from which the following quotations are taken:

"But new plants are seldom paying at the start. Several years are usually required before they obtain a sufficient amount of business or earnings to cover operating expenses, including depreciation and a reasonable rate of interest upon the investment. The amount by which the earnings fail to meet these requirements may thus be regarded as deficits from the operation. These deficits constitute the cost of building up the business of the plant. They are as much a part of the cost of building up the business as loss of interest during the construction of the plant is a part of the cost of its construction. They are taken into account by those who enter upon such undertakings, and if they cannot be recovered in some way, the plant fails by that much to yield reasonable returns upon the amount that has been expended upon it and its business. Such deficits may be covered either by being regarded as a part of the investment and included in the capital upon which interest is allowed, or they may be carried until they can be written off when the earnings have so grown as to leave a surplus above a reasonable return on the investment that is large enough to permit it. When capitalized, they become a permanent charge on the consumers. When charged off from the surplus, they are gradually extinguished. (These facts alone, however, do not always furnish the best or most equitable basis for the disposal of such deficits.) Whether they should go into the capital account, or whether they should be written off, as indicated, are questions that largely depend on the circumstances in each particular case."

"The cost of developing a business of waterworks may be made up of many different kinds of expenditures. . . . . It may also include

losses to the investors because of the fact that the plants in their earlier years fail to earn enough to meet all the requirements for operating expenses, including depreciation and a reasonable return upon the investment. If the direct outlays for securing business are charged to operating expenses as they should be instead of to the capital account, then the cost of acquiring a paying business would be represented by the deficits or by the amounts by which the gross earnings fall short of covering the cost of operation as stated including fair returns to the investors."

"But while such losses will have to be met by the investors, it is not expected that these sacrifices will be anything but temporary. The investors fully expect and in most cases rightly so, that these losses will be made good as soon as warranted by the business of the plant. They usually regard such deficits as an additional investment upon which, unless the whole amount is refunded to them in some form, they are entitled to the same returns as on the rest of their capital. Unless they are so compensated it is manifestly clear that no money from private sources is likely ever to be invested for such purposes, except perhaps in a few rare instances for philanthropic reasons."

"It would seem further that there is no principle of justice upon which the service can be had on any other terms."

"It thus appears that the cost of building up the business of a plant is in most cases as unavoidable as the cost of the construction of the plant itself; that when such costs are incurred they must be reimbursed in some form by the consumers in order that capital may be secured; that such reimbursement is equitable as between investors and consumers; and that this is a just method of dealing with such costs for other reasons. If this is sound, it also follows that the cost of the business must also be taken into consideration in determining the value of the plants for rate fixing purposes."

"This would seem to apply with special force where by law the rates are limited so as not to yield more than reasonable returns upon the investment. While such legislation may not be a guarantee against losses of any kind, it is clear that if the rates fixed under these laws should not include anything for the cost of building up the business, there would be no way in which these costs could be made good to the investors. In that event these costs would become a permanent loss to them; and the consumers, in turn, would be relieved from paying a reasonable return on a part of the investment or on the capital that is devoted to furnishing them with the service in question. This is a situation of which the investors are taking due notice, and which is entitled to due consideration. If not taken into account, it will tend to keep new capital from entering this field as well as to prevent exact justice to capital which has already entered the same. The former would

result in hardships or inconveniences to the consumers; the latter would apparently be unjust to at least many of the present investors in such utilities."

"They should not include items that have been incurred under other than usual conditions, or items that could have been avoided by the exercise of ordinary care and business judgment."[1]

The Wisconsin Commission has repeatedly reaffirmed its adherence to the rule thus laid down in the Antigo case.

In State Journal Printing Company *vs.* Madison Gas & Electric Company, decided March 8, 1910, the Commission not only strongly reiterates the rule laid down in the Antigo case, but again makes use of tables similar to those used in the earlier case to determine the cost of establishing the business (pp. 580–587). At page 585 of its opinion in the Madison case the Commission says:

"For public utilities which, under both the common and the statute law, under normal conditions are only entitled to reasonable returns on the investment, justice as well as equity appears to demand that the amounts, if any, by which they, under ordinary conditions, have failed to earn such returns, should be considered in fixing values and rates for such plants. In fact, such consideration would in most cases seem to be absolutely necessary in order to secure the capital required."

In Ripon *vs.* Ripon Light & Water Company, decided March 28, 1910, the Commission applies the same rule and prepares tables on the same basis, reviewing the earnings and expenses of the property during a period of fifteen years, saying at page 16:

"During a considerable portion of its period of operation the gross earnings of the respondent company have not been high enough to cover operating expenses, including the promotion of business, depreciation and a reasonable return in the form of interest and profits. Such deficiencies must be met by the owners of the property, either in the form of additional capital put into the business, or the absence of a return upon their investment, and can be said to constitute an additional investment necessary to building up the business."

The same principle is reaffirmed by the Wisconsin Commission in its decision in the Chippewa Falls Lighting Company case, decided June 14, 1910, quoting at length from the Antigo decision (see pp. 314–315). In the Fond du Lac Water Company case decided by the same Commission August 19, 1910, the history of

[1] Hill et al. *vs.* Antigo Water Co. 3. W. R. C. R. 623, 711, 712.

the property and examination of its gross and net earnings is carried back over a period of twenty-four years (see Table I, page 520 of that decision), the Commission saying at page 459, after stating the method of computation of past deficits which was the same as they applied in the Antigo case:

"The amount by which the value of the plant on August 1, 1909, as thus computed exceeds the tentative valuation of physical property may under this method be termed the going value of the property. This method of estimating the going value follows quite closely the methods discussed by this Commission in the cases of Hill *vs.* Antigo Water Company and in State Journal Printing Company *vs.* Madison Gas & Electric Company, and it would seem that no further discussion is required herein."

Such method of fixing going value may permit the inclusion in capitalization of such expenditures as are made for furnishing electric fixtures free of cost, installing house wiring, or gas stoves at less than cost, the donation of gas, electricity or water for public amusement or benefit. Also the cost of display advertising, canvassing, or instruction of customers or other expenses which help develop income more rapidly than normal. The best informed usually prefer that such expenses should not be capitalized and made a continuous burden on the public, but rather that they should be included as a part of the operating expense, thus keeping down capitalization. It has been proposed that the cost of holding the present business, or such expense as would be included as a part of the normal conservative growth of the business, should be charged to operating expense, while the cost of getting new business should be charged to capital account. Theoretically, such a division appears perhaps logical and equitable, but in practice for most companies at least, it will be found difficult to separate the costs so that many feel that the capitalization of any such costs, is not conservative business management.

To definitely determine what expenditures are legitimate and what part of them are not, is not always an easy matter. The difficulties in the way of doing this are also increased by the fact that the early records of the plants are, as a rule, either inaccessible or incomplete. But even at this the task is not insurmountable, while there may be a lack of data in some cases, there may be an abundance of such facts in others. The conditions which obtain

for some plants may be a fair indication of the situation for others, where the circumstances are similar. In any event, what constitutes the normal cost of developing the business, like the cost of the physical value, the fair rate of profit and other elements, is a question which can only be determined by investigation of the particular property under consideration.

"In addition to those mentioned, there is also another element that should receive some consideration in fixing the cost of the business, and that is the profits the plants have earned since they reached a paying basis. If these profits are so large as to be considerably above those ordinarily obtained, it is conceivable that strict justice between investors and consumers might require that these excesses should be treated as an offset to early losses, and that in this way all or a part of the earlier losses may have been wiped out. In dealing with this feature of the situation, however, it should be borne in mind that the risks involved are much greater at first than later on, when the adaptability of the plant has been proven and when its business has been secured; and that since risks are one of the leading elements that determine the rate of profit, the rate of returns to which the investors and those who carry on the business are entitled may be considerably higher during the earlier and more risky periods than is the case later. Just how much importance should be attached to the difference in the earnings as between the earlier years and later years, is not clear. Much depends on how the operating expenses including depreciation, have been treated, and what sums have been included therein, or excluded therefrom. In this connection a great deal may also depend on such definitions as have been placed on the word "reasonable" as applied to the rate of returns. These are matters, however, that to a considerable extent, are subject to proof, and may therefore be disclosed on the proper kind of inquiries."[1]

In order to better illustrate the theory adopted by the Wisconsin Commission in building up the cost of going value or the "cost of service" value, the accompanying typical diagram is introduced. It will be seen that the first year is wholly occupied with plant construction, during the second year partial operation is begun and extended until the plant is wholly in operation at the beginning of the third year, from which point operating expenses, interest on the cash invested, taxes and depreciation are assumed to increase at a uniform rate, meanwhile business expands normally, gross earnings improve at an

[1] Hill *vs.* Antigo Water Company 3 W. R. C. R. 623.

increasing rate until income gradually exceeds expenses and a profit is realized. During the construction period, with little or no income, a deficit rapidly accumulates by reason of accruing interest, taxes and depreciation to meet which money must be borrowed at interest, further increasing the deficit, which, until the time earnings equal operating expenses, is capitalized as a part of the total expenditure necessary to create a going property. Thus according to the theory of the Wisconsin Commission utilities are entitled to recover early losses, not the result of mismanagement, provided no more than a fair return has meanwhile been earned on the investment.

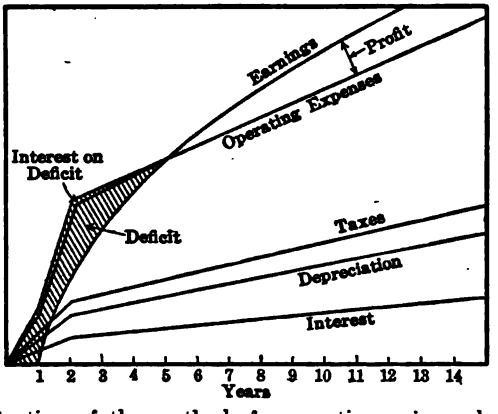


FIG. 3.—Illustration of the method of computing going value, as used by the Wisconsin Commission.

The Supreme Court of Oklahoma in the Pioneer Telephone case, recognized the fairness and logic of the method of determining going value used by the Wisconsin Commission quoting from the decision of the Commission in the Antigo case and deciding that the Oklahoma Railroad Commission erred in failing to make a similar allowance, in the case under its jurisdiction. The Court then finds that the going concern value of the telephone company is equal to 20 per cent. of the cost of reproduction of its plant on the sum of which two items the commission erred in not permitting earnings as a fair return.

"Subscribers are not obtained without expenditure of money, labor and time, during which the capital invested in the plant earns nothing and often fails to pay operating expenses. The customers must be

connected with the system of the plant, trained employees must be obtained, and a system of operation must be established. Few industries, if any, involving an investment of $90,000 or more, can be made self-sustaining from the first day of their operation. The uncontradicted evidence in this case discloses that appellant's plant for the years preceding the first hearing, failed to produce revenue sufficient for operating expenses, current repairs and lay aside an amount for depreciation. During the time of development there is a loss of money actually expended and of dividends upon the property invested. How shall this be taken care of? Must it be borne by the owner of the plant? Or by the initial customers? Or shall it be treated as part of the investment or value of the plant constituting the basis upon which charge shall be made to all customers who receive the benefits from the increased service rendering power of the plant by reason of these expenditures? It seems that the last solution is the logical, just and correct one. If rates were to be charged from the beginning so as to cover these expenditures and earn a dividend from the time a plant is first operated, the rate to the first customers would be in many instances, if not in all, so exorbitant as to be prohibitive and would be so at the time when the plant could be of service to them. On the other hand, the public cannot expect as a business proposition or demand as a legal right that this loss shall be borne by him who furnishes the service; for, investors in public service property make such investments for the return they will yield; and, if the law required that a portion of the investment shall never yield any return, but shall be a total loss to the investor, capital would unwillingly be placed into such class of investments, but the law in our opinion does not so require. Private property can no more be taken in this method for public use without compensation, than by any other method. When the use of the property and the expenditures made during the non-expense paying and non-dividend paying period of the plant are treated as an element of the value of the property upon which fair returns shall be allowed, then the burden is distributed among those who receive the benefits of the expenditures and the use of the property in its enhanced value."[1]

In estimating going value from a consideration of and allowance for a fair return during early years when same has not been earned, common sense and good judgment must be used. In the Coney Island and Brooklyn Railroad rate case, before the Public Service Commission of New York, First District, the engineer of the company submitted an estimate of the going value of the property based on the earnings for a period of some sixty years previous. The value of the property at the close of each year

[1] Pioneer Telephone & Telegraph Co. *vs.* Westenhaven. 118 Pacific 354.

was taken separately and the net earnings applied to the principal, less the amount required for a fair return, the balance being carried forward in the same way that going value is estimated by the Wisconsin Commission. Thus, in the case of the company referred to, the deficiencies were carried forward from year to year at compound interest and eventually showed an amount aggregating more than the value of the physical property, which the expert claimed should be considered the capitalization upon which a return at present should fairly be allowed. This of course is carrying the matter to extremes. It can hardly be argued that the original Horse Railroad, which had clearly demonstrated itself a business failure should be added, investment, passed dividends and all, to the value of the electrical system and the latter be made to pay returns on an investment which had never proved itself of value.

The criticisms which can fairly and logically be made to the method of estimating going value adopted by the Wisconsin Commission are:

(a) The reproduction cost of the physical plant is increased by the actual cost in the past of building up the present business instead of by an estimated cost of reproducing a like business.

(b) The expenditures made in the past in building up the present business are usually assumed to have been properly and advantageously made, which may or may not have been the case.

(c) No scientific theory or definite rule has been determined fixing the period during which the deficits in income shall be permitted to be capitalized, resulting in inequality as between corporations and possible encouragement of mismanagement and capitalization of unwise expenditures.

Third.—Going value has also been used to mean the value that obtains from capitalizing the present net earnings of a corporation, *i.e.*, the value of a created income. In this sense it is closely allied to good will and may perhaps be fairly applied in determining the value of the business of a private corporation, but has no place in consideration of value on which to base a fair return when considering a public utility corporation operating as a controlled monopoly, for the reason fully explained under "Good Will." Such evaluation based on the total net earnings, would

include in going value, the value of good will, franchise, etc., unless these were first separately valued.

It has been suggested that the modification of this method, used in determining "immaterial properties" value, in the appraisal of the railroads by the State of Michigan, namely the capitalization of net earnings remaining after deducting a fair return on the value of the appraised physical property, is erroneous and misleading because the same total valuation would be obtained by capitalizing total net income regardless of plant values. Moreover the method used is based on an assumption that income is proper, hence rates are fair which is simply basing values on rates, which perhaps proved a satisfactory method of establishing values for purposes of taxation.

The Supreme Court in the Kansas City Water Works case says

"The city steps into possession of a property which not only has the ability to earn, but is in fact earning. It should pay, therefore, not merely the value of a system which might be made to earn, but that of a system which does earn."

Fourth.—Although the trend of modern movement is toward the reduction rather than the creation of non-physical values, going values have been allowed, particularly in waterworks appraisals, based on the present worth of estimated earnings including those of future business growth.

The method consists in estimating the present worth of excess earnings of an existing plant compared with those of a hypothetical plant, between the date of valuation and the time the earnings of the assumed plant shall equal those of the existing plant.

A very complete and valuable paper explaining this method of determining going value has been jointly and recently presented by two well-known and competent authorities on appraisals, particularly those relating to waterworks, Mr. L. Metcalf and Mr. J. W. Alvord. As no better exposition of this theory has been presented, the author has attempted to summarize this paper and quotes therefrom, at length.

Going value as defined by Messrs. Metcalf and Alvord relates exclusively to "the cost of acquiring a given income," being a value "between" a tangible and intangible value, the former representing physical property and the latter, as here used, estimated value, going value being an actual cash expenditure,

as estimated to produce certain results. The present worth of going value, to be logically determined, must be based on the cost of reproduction and may be estimated by determining the difference in earning capacity between the existing property and a hypothetical new property which has been called the "Comparative Plant." The construction of the hypothetical plant is assumed to begin at the date of appraisal and to progress as rapidly as practicable, beginning business as completion of parts will permit, and steadily acquiring and increasing business until the total amount equals the amount of business that is estimated shall be done by the existing company, at its present rate of progress at that time of equality in the future. The estimate for the existing plant is independently completed and then the estimate for the comparative plant is made on the assumption that as fast as plant construction permits the new company takes the business of the old company, without competition, the use of the property of the existing company being discontinued as the new plant is ready to render service. Going value is, as stated by the authors:

"The sum of the present worths of the annual excess in net earnings, or return, from the existing plant, as compared with those from the comparative plant, in the period of years from the date of valuation to the time when the earnings of the comparative plant can reasonably be assumed to equal those of the existing plant, is then the measure of the going value of the existing plants."

The matters to be considered in figuring going value based on a comparison of an existing and hypothetical plant are:

(a) The time required to construct the hypothetical plant.
(b) The time required for the earnings of the hypothetical plant to overtake those of the existing plant.
(c) The capacity of the existing plant in relation to present business.
(d) The depreciation charges of each plant.
(e) The gross income, with rate of increase, for each plant.
(f) The operation, maintenance, depreciation, taxes and other similar expenses omitting return on the investment.

To indicate exactly the application of the principles outlined by Messrs. Metcalf and Alvord, the following example is quoted from their paper in the Transactions of the American Society of Civil Engineers, Vol. LXXIII.

APPLICATION OF PRINCIPLES OUTLINED

Assumptions as to Existing Plant.—For the sake of illustration, and to make clear the principles which have been discussed, the writers have assumed a typical case in order to show the steps necessary to determine the going value of a large property on the comparative method herein outlined.

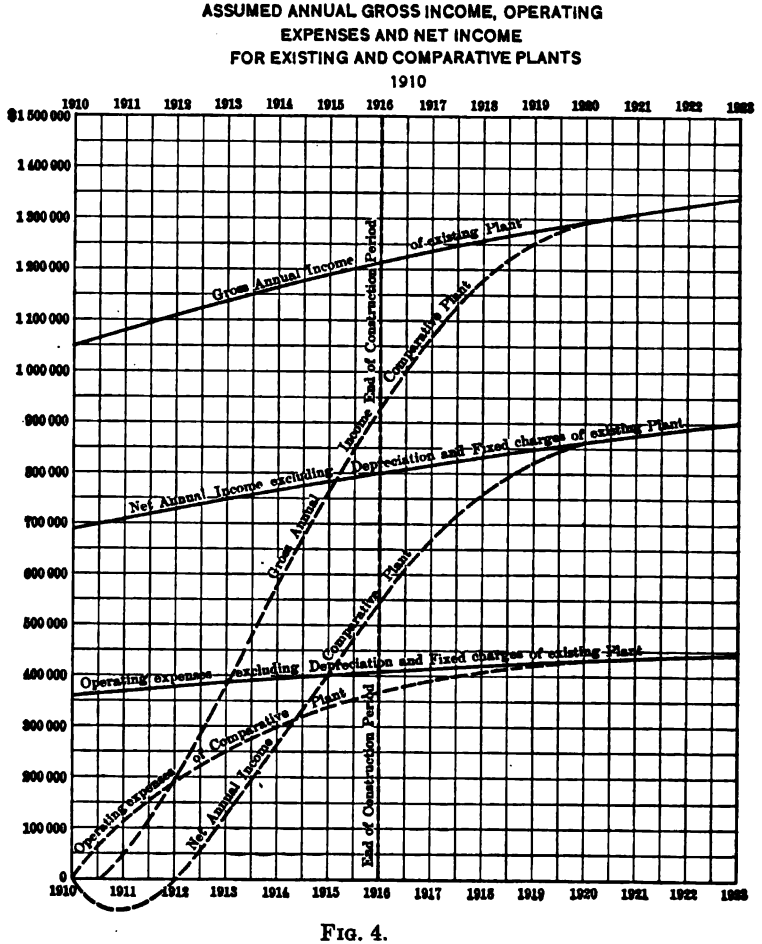


FIG. 4.

The plant which has been taken for illustration is an imaginary one, supposed to serve a population of 300,000 persons, but care has been taken to make the data consistent and conformable to figures found in operation. This statement is made, however, that the reader may not be misled into supposing that the figures have been copied directly from the report of any public or private waterworks.

In Fig. 4 is shown a forecast of the assumed probable gross annual income, net annual income (excluding depreciation and fixed charges), and operating expenses (excluding depreciation and fixed charges), of the assumed plant, called "the existing plant," which is supposed to be based on the past financial history of such plant, and the assumptions contained in Table I.

It is further assumed that the investment in the physical part of the existing plant amounted to $8,600,000, at the time of taking.

The problem, therefore, consists in determining: first, the interest loss during construction, and second, the going value.

Date of Valuation.—The valuation of this plant is assumed to be made as of January 1, 1910.

Construction Period Required.—It is assumed that a period of 6 years —say from 1910 to 1916—would be reasonably required to build a new comparative plant identical with the existing plant, as of the date of taking in 1910.

Going Value Development Period.—It is assumed that a period of 10 years (or, in other words, 4 years in addition to the period of construction) will be required by the comparative plant to develop an income identical with that of the existing plant.

Beginning of Operation.—In spite of the fact that a 6-year period has been assumed to be required to build the comparative plant, it is assumed that a prudent investor would plan his order of construction so as to make available at the earliest possible moment certain parts of the comparative plant, such as the water supply and distribution pipe system, so that the latter could be put into commission and become a source of revenue at as early a date as practicable. Obviously, the magnitude of the interest charges on the comparative plant, during the construction period, would be a strong incentive to such a course of action.

Character of Plant and Order of Construction.—For purposes of illustration, it is assumed that the plant under question consists of a pond or driven-well supply, of limited extent, supplemented by a filtered river-water supply derived through large impounding or storage reservoirs, involving the construction, not only of a filter plant, but of expensive impounding reservoirs, dam, and conduits, two pumping stations, one to care for the small pond or driven-well supply, the other to care for the main supply from the impounding reservoirs.

The assumed order of construction is shown in Table II, grouped under:

1. Distribution pipe system;
2. Pond or driven-well supply, and sterilizing plant, with pumping station;
3. Filter plant, conduits, etc.;

TABLE I.—GENERAL STATISTICS RELATING TO ASSUMED WATERWORKS PLANT
"The Existing Plant"

Year ending December 31	1910	1915	1920
Population	300,000	330,000	365,000
Miles of pipe, all kinds	480	520	570
Population per mile of pipe	625	635	640
Taps in service (live)	40,000	45,000	51,000
Per 1000 population	133	136	140
Per mile of pipe	83	86	88
Persons per tap	7.5	7.3	7.16
Consumption, annual, in millions of gallons.	10,950	13,250	15,980
Daily, in millions of gallons	30	36.3	43.8
Per capita, in gallons per day	100	110	120
Per mile of pipe, in gallons per day	62,500	69,800	76,900
Per tap, in gallons per day	750	807	859
Hydrants (number)	3,840	4,420	5,130
Per 1000 population	12.8	13.4	14
Per mile of pipe	8	8.5	9
Gross income (total)	$1,050,000	$1,190,000	$1,296,000
Per capita	3.50	3.61	3.55
Per mile of pipe	2,190	2,290	2,270
Per tap	26.25	26.40	25.40
Per million gallons consumption	95.90	89.90	81.10
Gross income, exclusive of hydrant rentals.	$896,400	$1,013,200	$1,192,320
Per capita	2.99	3.07	3.26
Per mile of pipe	1,870	1,950	2,090
Per tap	22.40	22.50	23.40
Per milllion gallons	81.90	76.50	74.60
Cost of operation, exclusive of fixed charges and depreciation.	$360,000	$402,000	$430,000
Per capita	1.20	1.22	1.18
Per mile of pipe	750	773	754
Per tap	9.00	8.94	8.44
Per million gallons	32.90	30.30	26.90
Percentage of gross income	34.3%	33.8%	33.2%
Net income, exclusive of fixed charges and depreciation.	$690,000	$788,000	$866,000
Per capita	2.30	2.39	2.37
Per mile of pipe	1,440	1,510	1,520
Per tap	17.25	17.50	16.97
Per million gallons	63.00	59.40	54.20
Percentage of gross	65.7%	66.2%	66.8%
Hydrant rental (total)	$153,600	$176,800	$205,200
Per hydrant	40	40	40
Per mile of pipe	380	340	360
Taxes (annual)	84,000	95,200	103,680
Percentage of gross income	8%	8%	8%

Note.—The units have been computed by slide-rule.

TABLE II.—INTEREST DURING CONSTRUCTION AND PROGRESSIVE AMOUNT OF INVESTMENT

"The Comparative Plant"

Date	Distribution pipe system	Pond or driven-well supply, sterilizing plant and pumping station	Filter plant, conduits, etc.	Pumping station for enlarged supply and extension of same	Storage dam and impounding reservoir	Total net physical value, exclusive of going value and interest during construction	
						During year	To date
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
January 1, 1910							
January 1, 1911	$400,000	$400,000	.....	.....	.....	$800,000	$800,000
January 1, 1912	900,000	300,000	$300,000	$100,000	$100,000	1,700,000	2,500,000
January 1, 1913	900,000	.....	500,000	400,000	300,000	2,100,000	4,600,000
January 1, 1914	900,000	.....	300,000	300,000	400,000	1,900,000	6,500,000
January 1, 1915	800,000	.....	.....	200,000	300,000	1,300,000	7,800,000
January 1, 1916	500,000	.....	.....	100,000	200,000	800,000	8,600,000
Totals	$4,400,000	$700,000	$1,100,000	$1,100,000	$1,300,000	.....	$8,600,000

4. Pumping station for enlarged supply and extension of same after the year 1913 by the installation of additional pumping units;
5. Storage dam and impounding reservoirs.

The real estate, water rights, and rights of way are assumed to be distributed in the several divisions to which they appertain.

The cost of engineering and contingencies is also included under the several individual items cited above.

The interest during construction, however, as well as the going value, remains yet to be determined.

Beginning of Operation of Different Portions of Comparative Plant.—It is assumed that by January 1, 1912, the small supply from pond or driven-wells will be available. The filter plant and main pumping station is assumed to be completed and ready for service as of January 1, 1914, the additional pumping units installed thereafter being ready for service between January 1, 1915 and 1916. It is assumed that on or about January 1, 1915, the storage dam and impounding reservoirs can be put into service, though not finally completed until January 1, 1916, and that the pipe distribution system built in any year is available for service the following year.

Loss of Interest During Construction.—In Table III has been computed the loss of interest during construction on this plant, based directly on the assumptions made as to the order of construction shown in Table II and the discussion following, and on the further assumption that the dividing line for the charges for loss of interest on construction account and on operating account is drawn at the point of completion and putting into service of any revenue-producing unit of the plant.

TABLE III.—COMPARATIVE PLANT
Interest During Construction

Date	Total net physical value, exclusive of going value and interest during construction		Average amount on which interest is chargeable for one full year to capital account	Interest on amounts in Column 4 at 6 per cent.	Total net physical value and interest during construction, exclusive of going value	
	During year	To date, December 31			During year	To date
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1910–1911	$800,000	$800,000	$400,000	$24,000	$824,000	$824,000
1912	1,700,000	2,500,000	1,650,000	99,000	1,799,000	2,623,000
1913	2,100,000	4,600,000	1,550,000	83,000	2,183,000	4,806,000
1914	1,900,000	6,500,000	2,650,000	159,000	2,059,000	6,865,000
1915	1,300,000	7,800,000	1,450,000	87,000	1,387,000	8,252,000
1916	800,000	8,600,000	500,000	30,000	830,000	9,082,000
Total allowance for lost interest-during-construction item				$482,000		

Thus, loss of interest during construction is allowed on the average amount of investment during the year 1910 at the rate of 6 per cent., on the assumption that the work built during that year cannot be revenue producing until after the year 1911, pending completion of the water-supplying works. Similarly, interest is allowed during the year 1911, not only on the investment during the year 1910, but on the investment during the year 1911. After January 1, 1912, however, the interest on the investment in pond or driven-well supply is assumed to be charged to operating cost as fixed charges, and not to capital account under the head of interest lost during construction, for the reason that it is assumed that this portion of the plant, being available through the agency of the pond or driven-well supply and the distribution pipe system built up to that date, is now in the revenue-producing class. Similarly, interest lost during construction is charged to capital account on the filter plant, during the years 1912 and 1913, and thereafter to the operating account as fixed charges, for the reason that the filter plant is assumed to be in revenue-producing operation after January 1, 1914, when it is assumed to have been completed, although the water-works plant as a whole is not assumed to be finished until January 1, 1916.

New Construction in Going Value Development Period Ignored.—No consideration is taken of the new construction required during the construction and going value development period, 1910 to 1920, for the reason that, whatever profit or loss is involved thereby accrues alike to both plants in the comparative method, and so has no effect on the going value under determination.

OPERATIONS OF EXISTING PLANT

In Table IV are shown the assumed operating statistics for the existing plant.

TABLE IV.—EXISTING PLANT
Annual Income and Expense

Year ending December 31	Gross income	Operation, maintenance, and taxes	Net income, exclusive of depreciation and fixed charges	Depreciation	Net income applicable to fixed charges and dividends
(1)	(2)	(3)	(4)	(5)	(6)
1910.....	$1,050,000	$360,000	$690,000	$ 90,000	$600,000
1911.....	1,080,000	370,000	710,000	91,000	619,000
1912.....	1,110,000	380,000	730,000	92,000	638,000
1913.....	1,140,000	388,000	752,000	93,000	659,000
1914.....	1,165,000	395,000	770,000	94,000	676,000
1915.....	1,190,000	402,000	788,000	95,000	693,000
1916.....	1,213,000	409,000	804,000	96,000	708,000
1917.....	1,235,000	414,000	821,000	97,000	724,000
1918.....	1,255,000	420,000	835,000	98,000	737,000
1919.....	1,275,000	425,000	850,000	99,000	751,000
1920.....	1,296,000	430,000	866,000	100,000	766,000

Operations of Comparative Plant.—In Table V are shown the assumed financial operations of the new comparative hypothetical plant, without allowances for the income from unemployed capital.

Income on Unemployed Capital.—In Table VI is shown the first trial computation relating to the income on unemployed capital. It will be remembered that it was suggested that, in this method of computing going value, one should consider himself at the parting of the ways, with an amount of capital in hand sufficient to buy the existing plant—covering in the cost thereof the value of the physical plant, interest during construction, going value, and franchise value—and follow through the steps relating to investment in the comparative plant, which the capitalist would take, and the return which he would get in the form of interest on his unemployed capital.

TABLE V.—COMPARATIVE PLANT
Annual Income and Expense
(From Operation, Exclusive of Interest on Unemployed Capital)

Year ending December 31	Gross income	Operation, maintenance, and taxes	Depreciation		Net income applicable to fixed charges and dividends
			Sum on which it is based	Amount at 1 per cent.	
(1)	(2)	(3)	(4)	(5)	(6)
1910.....	.....	.....	.....	.....	.....
1911.....	$ 50,000	$118,000	.....	.....	$68,000
1912.....	195,000	195,000	.....	.....	.....
1913.....	385,000	255,000	$2,123,000	$21,000	109,000
1914.....	575,000	305,000	3,106,000	31,000	239,000
1915.....	760,000	344,000	6,065,000	61,000	365,000
1916.....	923,000	372,000	7,152,000	71,000	480,000
1917.....	1,063,000	394,000	9,082,000	91,000	578,000
1918.....	1,175,000	410,000	9,082,000	98,000	667,000
1919.....	1,250,000	422,000	9,082,000	99,000	729,000
1920.....	1,296,000	430,000	9,082,000	100,000	766,000

Let it be assumed that he could place idle funds at a 4 per cent. rate, except as to the funds required for the year's construction, on which the bank rate of interest is assumed to be 2 per cent. For simplicity, let it be further assumed that on the money expended during one year, 6 months' interest at 2 per cent. can be obtained from the bank, corresponding to a 2 per cent. rate on bank balances during the year.

Obviously, the first difficulty with which one is confronted is that the going value has not yet been computed. The comparative physical plant was assumed to have a value of $8,600,000; the loss of interest during construction was found, by Table III, to amount to $482,000; the total investment in physical plant, including loss of interest during

TABLE VI.—FIRST TRIAL COMPUTATION OF NET ANNUAL INCOME (FROM OPERATION AND FROM INTEREST ON UNEMPLOYED CAPITAL) OF COMPARATIVE PLANT

Assumed capital in hands of the Investor-Builder on January 1, 1910:

Value of physical plant	$8,600,000
Interest during construction (Table III)	482,000
Assumed going value (first trial)	1,800,000
	$10,882,000

Year ending December 31	Net income from operation (see Column 6, Table 5)	Determination of interest on unemployed capital of comparative plant								Total annual income or return on comparative plant. Column 2 plus Column 10
		Total investment to date in comparative (physical) plant and interest during construction	Going value [1]	Total assumed investment to date. Column 3 plus Column 4	Amount invested which is earning 4 per cent. interest	Amount withdrawn for construction during the year [2]	One year's interest on		Total interest. Column 8 plus Column 9	
							Column 6 at 4 per cent.	Half of Column 7 at 2 per cent.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1910.....	0	$824,000	0	$824,000	$10,058,000	$824,000	$402,000	$8,000	$410,000	$410,000
1911.....	$68,000	2,623,000	$179,000	2,802,000	8,080,000	1,978,000	323,000	20,000	343,000	275,000
1912.....	0	4,806,000	485,000	5,291,000	5,591,000	2,489,000	224,000	25,000	249,000	249,000
1913.....	109,000	6,865,000	811,000	7,676,000	3,206,000	2,385,000	128,000	24,000	152,000	261,000
1914.....	239,000	8,252,000	1,126,000	9,378,000	1,504,000	1,702,000	60,000	17,000	77,000	316,000
1915.....	365,000	9,082,000	1,395,000	10,477,000	405,000	1,099,000	16,000	11,000	27,000	392,000
1916.....	480,000	9,082,000	1,607,000	10,689,000	193,000	212,000	8,000	2,000	10,000	490,000
1917.....	578,000	9,082,000	1,752,000	10,834,000	48,000	145,000	2,000	1,000	3,000	581,000
1918.....	667,000	9,082,000	1,842,000	10,924,000	−42,000	90,000	−2,000	1,060	−1,000	666,000
1919.....	729,000	9,082,000	1,884,000	10,966,000	−84,000	42,000	−3,000	1,000	−2,000	727,000
1920.....	766,000	9,082,000	1,897,000	10,979,000	−97,000	13,000	−4,000	0	−4,000	762,000

[1] These items are determined most easily by carrying the computations involved in Tables VI and VII along simultaneously. It is thus assumed that the new plant develops its going value gradually. [2] To cover physical plant, interest during construction, and going value.

construction in the assumed existing plant and hence also in the comparative plant, is therefore $9,082,000. The going value, however, is not yet known, and, therefore, must be determined by a series of approximate computations. The franchise is assumed herein to have nominal value only.

As a first trial, assume a going value of $1,800,000. Under this assumption, the total value (or cost to the investor) of the existing plant would be as follows:

Physical plant	$8,600,000
Loss of interest during construction	482,000
Assumed going value	1,800,000
Total value	$10,882,000

Therefore, the investor who has concluded to build a new hypothetical plant, instead of to purchase the old plant, is assumed to have in hand the sum of $10,862,000, as of January 1, 1910. He is assumed further, to adopt the same order of construction for the new comparative plant as shown in Table II. Under these assumptions, Tables VI and VII result.

TABLE VII—FIRST TRIAL GOING VALUE COMPUTATION AS OF JANUARY 1, 1910

Year ending December 31	Total net return			Present worth of excess earnings of existing over comparative plant			
	Existing plant	Comparative plant	Excess of existing plant	Period of years	Factor at 6 per cent.	Amount	Cumulative amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1910	$600,000	$410,000	$190,000	1	0.9434	$179,000	$179,000
1911	619,000	275,000	344,000	2	0.8900	306,000	485,000
1912	638,000	249,000	389,000	3	0.8396	326,000	811,000
1913	659,000	261,000	398,000	4	0.7921	315,000	1,126,000
1914	676,000	316,000	360,000	5	0.7473	269,000	1,395,000
1915	693,000	392,000	301,000	6	0.7050	212,000	1,607,000
1916	708,000	490,000	218.000	7	0.6651	145,000	1,752,000
1917	724,000	581,000	143,000	8	0.6274	90,000	1,842,000
1918	737,000	666,000	71,000	9	0.5919	42,000	1,884,000
1919	751,000	727,000	24,000	10	0.5584	13,000	1,897,000
1920	766,000	762,000	4,000	11	.....	2,000	1,899,000
				Resulting Going Value		$1,899,000	
				Assumed Going Value		1,800,000	
				Error on First Trial Computation		$99,000	

Resulting Going Value under First Trial Computation.—In Table VII is shown the result of the first trial computation of going value. It will be noted therein that the going value, which was assumed to be $1,800,000, was found to be approximately $1,899,000, involving an error in assumption of $99,000.

Were a going value of $1,900,000 assumed in the second trial computation, the resulting going value would be found to be somewhat less than that sum, on account of the greater amount of interest accruing on the unemployed capital, which tends to reduce the going value, the other items remaining substantially the same.

Probably closer results would be obtained by assuming for the second trial computation a going value of $1,880,000.

Recomputation Unnecessary for the Purpose of This Paper.—As going through the somewhat laborious process of recomputing Tables VI and VII would not shed any additional light on the principles enunciated, it is unnecessary, for the purpose of this discussion, to follow through this recomputation. Enough has been said to illustrate the principles involved by the method of computing going value suggested by the writers.

For the second trial, assume a going value of $1,880,000. The total value of the plant under discussion would then be:

Physical plant	$8,600,000
Interest during construction	482,000
Assumed going value (second trial)	1,880,000
Total value	$10,962,000

In the second trial computation, therefore, it should be assumed that the builder of the comparative plant starts, as of January 1, 1910, with the sum of $10,962,000 in hand.

Effect of Assumptions as to Order of Construction on Loss of Interest during Construction Item.—It will be apparent, from the foregoing discussion, that the larger the allowance for the loss of interest during construction item, the smaller will be the resulting going value, for the reason that, the gross income and operating expenses remaining the same, the amount of unemployed capital in the hands of the builder, will be increased. This, in turn, increases the interest accretions on unemployed capital, which have to be deducted from the net income of the existing plant in determining going value. The effect, therefore, of these deductions is to decrease the going value. It is obvious, however, that the decrease in going value is not equal to the increase in interest charges, for the reason that the interest allowances on unemployed capital are assumed at a lower rate than the loss of interest during construction item, and the present worths of the annual differences

in net income are taken in determining going value as of any given date, instead of the arithmetical sum of those differences.

Some interesting deductions and comments have been made by Mr. F. P. Stearns, in attempting to ascertain a uniform figure which may be used in appraising going value, based on certain data as to the valuation of water-works property, including going value, furnished by Mr. J. W. Alvord.

"If one takes the data from this table,[1] omitting the places having less than 10,000 inhabitants and the one place having a population of more than 100,000—the former being omitted because of their small size and the latter because it is hardly possible that it could be supplied from its original works—and also omits one case where there was competition between two rival plants, the following minimum, average and maximum results are obtained:"

Average population		34,555
Average net value of physical property		$774,567
Average going value		133,269
Going value per capita	Minimum	$1.65
	Average	3.86
	Maximum	6.90
Percentage of value of net physical property represented by the going value	Minimum	10.5
	Average	17.2
	Maximum	34.6

"Mr. Alvord calls attention to the lack of relation between the going value and the value of the physical property, and yet an average of the results attained in a number of cases where rational methods were used will give approximately this relation in the case of a normal plant.

"In the typical illustration used by Messrs. Metcalf and Alvord, the statistics are as follows:

Population	300,000
Net value of physical property, including interest during construction	$9,082,000
Going value	1,897,000
Going value per capita	$6.32
Percentage of value of net physical property represented by the going value	20.9

"The writer can easily conceive that there may be an actual deficiency in the returns during the earlier years of the operation of a normal

[1] Proceedings American Water Works Association, 1909, page 206.

water-works plant which will equal $133,000 for a plant valued at $774,000 and supplying 34,000 people, but he cannot conceive that, during the growth of such a plant to a net value of $9,082,000, with ability to supply 300,000 people, there can be an added deficit amounting to $1,764,000, or any sum approximating this amount, due to the development of the business incidental to the additions made from time to time."[1]

Practical application of the method hereinbefore described and illustrated for determining going value has been in several cases, notably that of the Macon Gas Light and Water Co. The figures used in the valuation for sole purposes of the Macon plant, together with diagram illustrating the method of ascertaining the going value of that plant are given in full in Chapter X.

From the preceding, it will be seen that the suggested theory of appraising going value, involves many assumptions and a large forecast of the future, based on the history of a property, which may or may not be a proper basis. The assumption that the business of any corporation, will continue to increase in the future along lines indicated by its recent history, is perhaps more applicable to waterworks valuations than to most other utilities; certainly many gas, electric light and railway companies would object to any such proposed method of determining their going values. Any predication of future profits on the previous rate of increase in business, in America, must not ignore the fact of the recent, rapid increase in population of the cities which may have caused a greater income to any given utility than the normal increase from territory, already served.

To figure that going value can be determined from the consideration of the actual gross and net incomes in past years, assumes that past rates have been fair, which may or may not have been the case.

The method of determining going value under consideration, omits any proper consideration of the deficits, if any, which occurred during the early history of the corporation, and such deficits, as explained in the preceding pages, is the basis of going value recognized and allowed for by the Wisconsin Commission and other authorities.

[1] Transactions American Society of Civil Engineers, Vol. LXXIII, Sept., 1911, page 365.

Contracts.—Although the Public Service Commissions have, as a rule, denied the right of capitalization of contracts between corporations and public bodies, such as franchises and licenses, beyond the actual cost legitimately extended in obtaining them, they may be capitalized under certain circumstances. The Supreme Court in the well-known Consolidated Gas case allowed the value of $7,500,000 for franchise. The Public Service Commission of St. Louis, in the appraisal of the property of the Union Electric Light and Power Company, capitalized, at 8 per cent., the rentals saved through an agreement with the local telephone company to the use of the latter's poles, allowing $80,000 therefor in the value of the property of the Light and Power Company.

Utility corporations very often have sought to capitalize the net returns from profitable contracts. Ordinarily, such capitalization is not properly allowed on the ground clearly set forth in a recent decision of the Public Service Commission of New York.

"The contention of the company as represented by the testimony of this witness in substance is that the profits from this contract for its remaining life shall be capitalized, that the amount thus reached shall be added to the fair value of its property and that the rates shall be such as will provide a fair return thereon. In other words, the city or the tax-payers must pay an exorbitant price for street lighting, and yet the general consumers must pay enough to yield an ample return (10 per cent. is urged) upon the capitalized value of such abnormal profits, capitalized upon a basis of 4 1/2 or 5 per cent. The absurdity of such a contention is apparent. Paraphrased, it is that the more the city pays the more the consumer must pay. If there is any relationship between these two factors, it is that the more the city pays, the less the consumer should pay, and this has been recognized in many franchises for water and lighting plants. Indeed, the original contract and its history indicate that street lighting and the price obtained therefor have always been very important factors, and at the beginning were the chief concern of the company. Apparently, the original plant was built principally with a view to this business, and the contract was a very important inducement to the company to begin operation. It is obviously unfair that this very contract should be used to make the public pay a higher rate than they otherwise would.

"The argument of the company proves too much, for, if it is correct, it could be argued that every contract should be similarly treated. The public lighting contract resembles other contracts between company and

consumers. All are property, and presumably all are profitable. Those that are could be capitalized if this one may, and the more profitable they are, the higher must the rates to others be placed. Conversely, if any one should not be profitable, the capitalized loss should be subtracted from the fair value of the other "property," and the rates lowered accordingly.

"It should be noted further, that the company does not claim that the contract itself represents any investment or that any deposit, fee or payment was required by the authorities.

"The Commission can find no reason in law or equity which would justify the capitalization of the street lighting contract and the inclusion of such capitalization in the 'fair value' upon which the company is entitled to earn a fair return from the sale of gas to general consumers. It is unnecessary, therefore, to consider the methods of determining its value."[1]

[1] Case 1273, Mayhew *vs.* Kings County Lighting Company, Decision dated October 20, 1911, Public Service Commission of New York, First District.

CHAPTER VIII

DEPRECIATION

General.—There is to-day probably no subject requiring more illumination and coördination by the engineering profession than that of depreciation. The recent generally recognized necessity on the part of individuals and corporations, and the increasingly insistent demands by commissions, legislatures, and courts for proper allowances covering the reduction in worth of physical properties—be it more or less rapid—has resulted in a divergence of thought and a lack of uniformity of practice that is bewildering.

The important and wide use actually made of depreciation both in figuring operating expenses and net earnings, as well as in the determination of present values of physical properties, through appraisals, for purposes of taxation, rate making, capitalization or sale, make the subject of paramount importance to the engineer, so that the almost total absence, not alone of an approved theory of depreciation, but even the marked meagreness of authoritative literature on the subject, is striking. While certain methods have been developed and some general principles have been widely accepted, nevertheless, trustworthy engineering data on depreciation are exceedingly scarce, the application of methods of estimating depreciation varies widely and even the terms employed are used in a vague and contradictory manner.

It must be admitted that where engineers of experience, good judgment and integrity, appointed even by opposite "sides" may be expected to approximately agree on the "original cost" or the "cost to reproduce new" they differ much more widely in attempting to determine depreciation. This in part arises from honest differences of opinion, as the problems are not possible of exact mathematical solution and the gradations from one class of depreciation to another are frequently so gradual as to be barely distinguishable; and yet, a consideration of what depreciation—if any—has taken place in the physical property of every corporation must be had, in order to obtain a safe—though it may be very approximate—indication as to proper or improper capitalization.

"Absolute" and "Theoretical" Depreciation.—Before undertaking to discuss proper methods of estimating and allowing for depreciation, it is essential to have clearly in mind just how depreciation actually takes place and in what way it effects physical property.

Where property is no longer of service, it must be depreciated down to the value at which it may be sold, even though that value is as low as scrap value. On the other hand, apparatus that is in use and rendering a service economically, may for the purpose for which it was intended, be as valuable as when originally installed, although its age may be approaching the limit of its life. Take for example a steam engine which though having been in use for the greater part of its estimated life is, through proper maintenance, in as good condition to render service as at any time in its history. If its annual maintenance charge is no greater than in the earlier years of its history, its "service value" to the company as a going piece of property is as great as when first installed.

What then do we mean by depreciation? Reference to Fig. 5 indicates graphically several ways in which depreciation actually takes place, as well as usual methods heretofore adopted in considering and evaluating depreciation.

Assume that a given piece of physical property has an estimated life of twenty years, represented by the abscissa *O B*, and that it has a given value in dollars, shown by the length of the ordinate *O A*. Let the ordinate *O C* represent the worth in dollars of the apparatus as scrap or junk, then the abscissa *C D* will represent the scrap value throughout the life. This line is usually approximately a straight line, deviating therefrom simply by fluctuations in the value of scrap material, which is usually within fairly narrow limits. The point *D* is the value of the apparatus in question at the end of its life. It may reach this value through any one of several methods of depreciation, shown graphically by the curves No. 1, 2, 3, 4, 5 and 6.

Curves 1, 2 and 6 may be said generally to represent "absolute depreciation"; and curves 3, 4, 5 "theoretical depreciation."

Considering "absolute depreciation," curves 1 and 2 represent the values, during any period of their lives, of most pieces of physical property, determined from the standpoint of bargain and sale for use elsewhere. The salable value of new apparatus depreciates very rapidly from the moment installed and then

gradually during the remainder of its life down to "scrap value." The values thus illustrated are independent of the service for the particular installation for which the apparatus has been purchased and installed. Curve 1 may fairly represent the worth of certain pieces of property such as:

a. Special machinery, the value of which, for use in connection other than that for which it has been installed, would necessitate

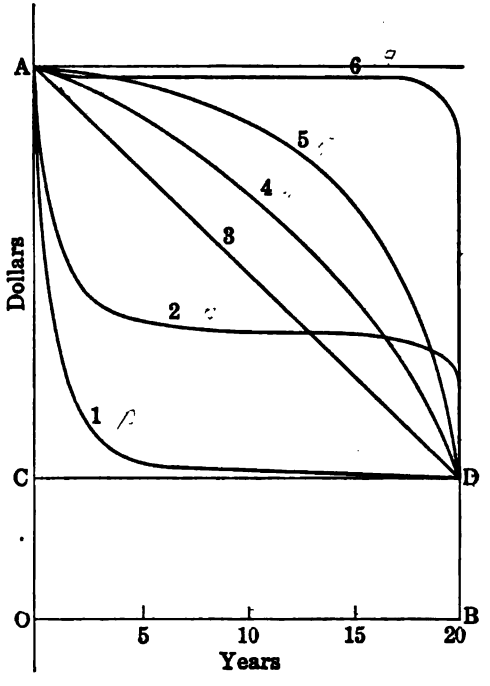


FIG. 5.

such a large expenditure for modification of design to make it useful elsewhere that little more than scrap value can be obtained from same.

b. Property the cost of removing which, compared to its cost new, is relatively high; for example, ties for track, or wooden poles of a transmission line.

Curve 2 represents sales value for more easily transported property, as for example the rolling stock or synchronous converters of a street railway system or transformers and meters of a lighting company.

The classes of depreciation indicated by the curves 1 and 2 might properly be called salvage values and approximate scrap or junk values, the principal difference being the property is sold for what it is worth as a unit rather than for its dismembered elements. It will be evident at once that depreciation of these classes cannot fairly be used in determining the value, on the basis of barter and sale in the general market, of the physical property of an operating entity. That this is true and the view taken by the courts, will be evident from consideration of the decisions in the Consolidated Gas and other similar cases and even in the Knoxville Water case, which is generally considered the most radical decision in the way of depreciating physical value.

Curve 6 indicates depreciation due only to wear and tear until just before the close of life, at which time other classes of deterioration may appear. The curve is based on the assumption that the apparatus in question will be used for the purpose for which it was installed, throughout its life, and being maintained in good operating efficiency, 100 per cent., is just as good for the purpose of use as the day it was installed, aside from such slight deterioration as results from wear and tear. That is, the value of the apparatus or construction, being used for its original purpose, is equal to its cost, new or original, less the evaluation of the wear which has taken place; for example, a few tubes in a boiler might be so badly burned as to render the boiler unfit for service. The value of the boiler as a whole in its assumed condition is practically worth little more than scrap, but by the expenditure of a few dollars in renewing the burned-out tubes the value of the unit, say for the purpose of original installation and use, is equal to the value of a new boiler. In any large system there is constantly a large number of parts always approaching the time of renewal. At any given instant of appraisal some such parts will be found completely worn out and the value of their replacement must be deducted from the cost new in order to obtain the real, actual and "absolute" depreciation at the instant of appraisal. But assuming the property as a whole is kept in first-class operating condition, that there is no inadequacy, obsolescence, or deferred maintenance and ignoring such slight deterioration as results from wear and tear at any given instant which may be apparent in detail parts in the system, the depreciation effecting the value of the plant for the

purpose installed may be considered nil practically throughout its life, as an operating property. In a given unit just before the close of life other classes of depreciation than wear and tear may set in or deferred maintenance may be allowed to appear, in which case, of course, depreciation must be considered, but otherwise the value of the property for its original use is equal to the cost to reproduce new, and it is the real value of its physical property to a "going concern." This value or its equivalent is that generally allowed in "purchase and sale transactions," and has been recognized by public service commissions and legal authorities.

"If the present value exclusively were to be taken as the basis, respondent would not receive credit for having installed any part of its plant at full cost. The present value, as of June 30, 1908, must, therefore, be increased by the amount of the estimated depreciation on that part of the plant which the company installed new."[1]

"Of the physical plant alone, the most equitable valuation for rate-making purposes appears to be best represented by the original cost of the plant and by the cost of reproducing it."[2]

This "service value" would also seem to be recognized by the courts both in rate cases and in determining valuations for sale.[3]

"Probably a fair statement would be that the physical value of the plant is its value as a performing plant for the purposes for which it was designed."[4]

If any contrary position were assumed, namely, that only "sales value," indicated under most favorable circumstances by curves 1 and 2, were to be used in determining present value, then a large portion of every going property would be practically valueless the day after construction and installation was completed, because the expense of removal would amount to more than the cost of new in the open market: for example, ties in a railway property; foundations and settings for machinery; pipe, deeply buried; cross-arms and many wooden poles.

[1] F. B. L. Fullmer *vs.* Wausau Street Railroad Co., Railroad Commission of Wisconsin, April 1, 1910.

[2] G. W. Hill et al *vs.* Antigo Water Company, Railroad Commission of Wisconsin, August 3, 1909.

[3] City of Omaha *vs.* Omaha Water Co. 118 U. S., 202. Wilcox *vs.* Consolidated Gas Co., 212 U. S., 19.

[4] Columbus Railway & Light Co. *vs.* City of Columbus, Circuit Court U. S. Southern District of Ohio, report of Master, page 34.

The classes of depreciation above discussed are going on constantly in any physical installation. They are at work and in evidence at any time despite the honest effort and even extravagant expenditure of the management to provide against and forestall depreciation. Property—except real estate or road bed—cannot usually be maintained at 100 per cent. of its original value and ultimate economy seeks only 100 per cent. operating efficiency. The complete physical plant of a going property would not ordinarily have a higher service value than 90 or 95 per cent., although it is conceivable, in case of a water power or other property including a large amount of real estate the value of which had risen rapidly, the service value might be 100 or 110 per cent. On the other hand, the realizable sales value of a property might be as low as 20 or 30 per cent. or even less.

There is considerable undue importance attached to the ratio of present value to reproduction cost new as expressed in percentage in connection with appraisal work. Many properties that have been appraised have been found to have present values of from 75 to 85 per cent. of the replacement cost, but that is no reason why such figures must necessarily be found in any new appraisal. If the property under consideration has been largely renewed, the percentage, particularly of a railroad, would run higher than the figures given. On the other hand, it is conceivable that a gas property in existence for a period of years and still giving satisfactory service to the public, might show figures considerably below those quoted.

With regard to keeping and accumulating of "depreciation funds" or "reserve funds" as they have been called, at first thought and superficially, it would seem that the sum of the plant value (the present value determined by appraisal) and the depreciation fund (where one is necessary) should at a given time equal the replacement cost, but as the depreciation fund will have been based on original cost which may be quite different from replacement cost, the depreciation fund in that case will not equal necessarily the difference between present and replacement values. As a property kept in good operating condition will ordinarily not be found to be in a condition below from 75 to 85 per cent. of the cost of reproduction, a fund larger than 15 to 25 per cent. would never be required, even on the theoretical basis proposed by some engineers and, as a practicable matter, a sum equal to from 3 to 5 per cent. of the original value

would ordinarily provide a fund for emergencies which would be amply sufficient for a property uniformly maintained.

In contradistinction to determination of present value by the use of depreciation expressed in the curves 1, 2 and 6, which may be termed "absolute," the curves 3, 4, and 5 indicate several classes of "theoretical" depreciation which have been quite widely used in some cases for estimating present values, but more often for determining the yearly theoretical deterioration for purposes of establishing depreciation funds, which, however, is quite a different subject. Making a theoretical estimate of the probable, future, average, annually accruing deterioration of certain property to provide an item in book-keeping accounts of operating expense has nothing whatever to do, in making an appraisal, with fixing the definite amount of absolute, actual or accrued depreciation which depends upon the present condition of physical property, determinable from inspection and not upon historical documents, depreciation funds, or disputed theoretical conclusions. Nevertheless, the erroneous application of rates of depreciation in the attempt to determine present commercial values for purposes of capitalization is fairly common, one of the most notable cases, because of the large amounts of money involved, being that of the Public Service Commission of New York, First District, in the matter of the Third Avenue Railroad Reorganization.[1]

These three curves 3, 4, and 5 represent classes of depreciation which seldom, if ever, occur in practice but are convenient for purposes of estimate, particularly curve 3, which represents what is called "straight line depreciation." As indicated, it assumes a gradual and constant reduction in the value of property throughout its life. The significance is that if, from the cost of apparatus, the value to be obtained at the end of its life, namely, the scrap value, is deducted, the remainder divided by the assumed life, in years, of the apparatus, will give the amount in dollars to be laid aside annually to accumulate a fund sufficient to replace the property at the end of its life without interest.

Curve 4 is closely related to curve 3; the annual depreciation fund, however, being less because it is assumed that the uniform amount of money laid aside annually during the life of the property will be put out at interest and compounded so that owing

[1] Case 1134, Opinion of Public Service Commission, First District, New York, Disapproving Plan of Reorganization, July 29, 1910.

to the accumulation of interest the amounts annually laid aside will be less than in the case of "straight depreciation." Curve 4 is called the "sinking fund" method.

Curve 5, a modification of curve 4, is based on the assumption that, instead of laying aside a regular amount annually and compounding, the amount laid aside will be small at first, gradually increasing in amount as the earning power of a property increases, as it generally does, with its life. These amounts are then assumed to be put out at compound interest so as to aggregate original cost of the apparatus at the end of its life. No general rule has been developed as to the proper amounts to begin laying aside or in what proportion they shall increase; but it is clear that the smaller are the amounts in the beginning the larger they must be toward the end of the life of the apparatus.

This latter plan of providing depreciation funds has the advantage of more nearly proportioning the annual depreciation payments in accordance with revenue, and for most pieces of property will more closely approximate the deterioration actually taking place.

A fourth plan of determining "theoretical" depreciation has been used to limited extent. It consists in assuming a given life for the property in question, ascertaining the annual rate of depreciation and then applying that rate uniformly to the principal diminished in amount each year by the deduction for deterioration. For example, if the principal invested were $2000 and the rate assumed is 10 per cent., the amount charged off for depreciation the first year would be $200, leaving the principal, $1800 on which 10 per cent. or $180 would be charged off the second year, and $162 the third year, etc.; thus the amount charged off becomes progressively less and the life of the property becomes, theoretically at least, infinite. Of course this method can be modified from the "straight line" depreciation illustration used above to the "sinking fund" method, if desired.

From the preceding it will be seen that any one of these four methods of estimating depreciation is based on absolutely arbitrary assumptions. Practically there is no more logical reason *per se* why the fund—if necessary—to replace the property at the end of its life should be provided in any one of the several methods suggested by the curves rather than in any other of the several methods. Each method will accomplish the same result, but it will be seen at a glance that in applying curves 3, 4 or 5,

the amounts to be laid aside annually will vary considerably, and to that extent effect net income; similarly, the effect on the worth of the owner's investment will also vary with the curve used, being appreciably less for "straight line" depreciation. Where the lives of property considered are relatively short, the result of using any one of these three curves is less pronounced; but where the lives are long, running to 50 or 100 years, the difference for the major portion of their lives is marked. The fourth plan suggested has not the advantage of being sound theoretically or advantageous practically.

The "straight line" method of depreciation has been more largely used than any other probably because the lives of much apparatus is brief; and, furthermore, the application of this method is the most simple, direct, and easily understood, and hence favored by many who are non-technical men, and naturally incline toward the more easily appreciated elements of the questions which they are compelled to consider and discuss.

There are three other methods of determining the depreciated value, that is the present value, of physical property which should be mentioned.

The first consists in estimating the cost of purchasing and installing second-hand or used apparatus of the type and character of that installed and equivalent for the same work. The difficulty of carrying out this method in practice is the impracticability of finding duplicate used apparatus and obtaining fair or uniform standards of price thereon.

The second proposal of some authorities is that the depreciated value of a plant should be determined by comparison with the cost of a most modern installation designed to do the same work. The impracticability of this theory arises from (a) the inability of the respective parties interested to agree on what is the proper theoretical plant; (b) the assumption that old property should always be renewed regardless of its usefulness or cost of its replacement. This method has apparently received some encouragement from the courts, as indicated by the quotation from the decision in the Cedar Rapids case, referred to under "Present Value."

A third method of ascertaining present value is to make an estimate of the cost of reproducing the physical property new and deducting therefrom the estimated expense of putting the existing property in a condition equal to new. The difficulty

of determining present condition compared with new, and the cost of the changes offer problems on which there can seldom be found agreement.

None of the three methods just mentioned above are generally favored.

As indicating the possible error in attempting to estimate "theoretical" depreciation, it is frequently found that the length of life assumed has been greatly surpassed by apparatus which is still giving reliable and satisfactory service. For example, the life of the ordinary steam engine may be taken at 20 years, but it is not uncommon to find engines still in use that are very much older than this. The writer noted, within a few months, that a vertical engine installed in England in 1856 had recently been equipped with condenser, supplied with superheated steam, and was still in use at 55 years of age, giving economical and satisfactory results. Cases of this kind will illustrate the necessity for personal inspection in determining depreciation and the need of experience and common sense in the application of any rules of depreciation. For apparatus still giving satisfactory service after the expiration of its assumed life, it is only fair in estimating theoretical depreciation to allow a value greater than scrap value; the minimum value of all types of engines, boilers, pumps, heaters, condensers, line transformers and shafting is at present being taken by the Wisconsin Commission, for example, at 25 per cent.; generators, motors, rotaries, arc lamps, wood and iron poles, 20 per cent.; station transformers, 40 per cent.; storage batteries, 35 per cent., and switchboard instruments and electric meters, which must be kept in a high state of repair, 80 per cent. as the minimum percentage of reduction cost for apparatus still in use though theoretically "dead."

It is the practice of the Wisconsin Commission, in addition to estimating depreciation in relation to expired life, to further modify their results with respect to the condition of the apparatus appraised, that is whether it is found to be in good, fair or poor condition. If in good condition, 100 per cent. of the value allowed on the basis of expired life is taken; if in fair condition, 90 per cent. of the unexpired life is allowed; but if in poor condition, only 80 per cent. of the unexpired life as figured is allowed. The decision as to the condition of the apparatus good, fair or poor

is determined by an inspector whose experience, judgment and common sense form the basis of his conclusion.

As 3, 4 and 5 per cent. are rather common rates of return on funds allowed to accrue with interest, the curves on the accompanying plate, Fig. 6, are given, being reproduced from the author's paper appearing in the June, 1911, Proceedings of the American Institute of Electrical Engineers. The curves indicate the values in percentages that obtain at any given time for apparatus having lives varying from 5 to 100 years. The abscissa graduated from 0 to 100 indicates the age, the ordinates 0 to 100 indicate either the percentage of depreciation to be subtracted from the cost to obtain theoretical present value or the percentage of the original value direct. To use the curves, start from a point on the abscissa indicating the life already expired, follow the vertical until it intersects with the curve marked with the assumed life of the property being considered, then follow the horizontal to the left and read from the ordinate the percentage of depreciation or the remaining present value as may be desired. Uniform or "straight line" depreciation, for the lives indicated by the diagram, may be obtained by drawing a straight line from the two points connected by any of the curves and reading from it instead of from the curve.

The fund that will accumulate at the end of any number of years through the annual laying aside of a uniform amount and putting that out at compounded interest, is determined by the following formula. (See Table IX.)

$$F = D\,\frac{(1+R)^N - 1}{R}$$

The sum to be laid aside annually at compound interest to accumulate a given amount at the end of a number of years is determined from the following formula. (See Table X.)

$$D = \frac{FR}{(1+R)^N - 1}$$

where F = the accumulated amount in dollars at the end of N years.

D = the annual amount of dollars laid aside at interest compounded every twelve months.

R = the annual rate of interest expressed as hundredths of a dollar.

N = the number of years the amount is annually laid aside.

During the past few years, a large and varied assortment of figures have been offered by more or less competent authorities as to the proper rates of depreciation to be applied to different classes of physical property in accumulating depreciation funds or in the determination of present values. These figures, while interesting and carrying the weight of individual authority have, in no sense, been judicially approved, the writer therefore has undertaken to set out in a table, shown in the following pages, Table XI, figures that have been used by commissions or others in rendering decisions which have in effect, largely become law.

The figures for "straight line" depreciation, given as those of the Wisconsin Commission, are derived by the Author from tables giving the lives of various property as used at present, by the Wisconsin Commission, but subject to change at any time.

While these tables show accepted rates of depreciation, which include as a rule some allowance for obsolescence and inadequacy, they should always be considered as tentative and subject to modification for any particular case, they cannot be applied indiscriminately and they must be used with conservatism and good judgment. They are given as indications of what has been done and the line of procedure heretofore followed. It would seem that we can only advance by a thorough understanding and knowledge of what other people are doing in treatment of the subject of depreciation, and these tables are given because they show figures which have been approved in important cases and as indicating what fairly may be expected by those who are interested in utility companies when they have to appear before Courts or Commissions. The re-adjustment of rates based on the use of such figures and their acceptance both by the Public Service Commissions and public utility companies, certainly establishes them much more firmly than mere engineering opinions and gives them in effect the semblance of law.

The figures given refer to "straight line theoretical depreciation" and have been applied to electrical properties, the life of the apparatus of which is noticeably short compared with many other classes of property, such as water works, gas plants, etc.

As will be recognized the figures given have been used for rate-making, sale and capitalization cases.

ACCUMULATION. TABLE IX—PART 1

To ascertain the fund which will accumulate during a period of years, when an account is laid aside yearly at a given rate of interest compounded annually, multiply the amount laid aside by the figures in the following table in the column appropriate for the interest rate assumed, and in the line opposite the number of years the annual payment is allowed to accumulate.

Years	½%	1%	1½%	1¾%	2%	2¼%	2½%
1	1.	1.	1.	1.	1.	1.	1.
2	2.005	2.01	2.015	2.0175	2.02	2.0225	2.025
3	3.015025	3.0301	3.045225	3.05280625	3.0604	3.06800625	3.075625
4	4.03010013	4.060401	4.09090338	4.10623036	4.121608	4.13703639	4.15251563
5	5.05025063	5.10100501	5.15226693	5.17808939	5.20404016	5.23011971	5.25632852
6	6.07550188	6.15201506	6.22955093	6.26870596	6.30812096	6.34779740	6.38773673
7	7.10587939	7.21353521	7.32299419	7.37840831	7.43428338	7.49062284	7.54743015
8	8.14140879	8.28567056	8.43283911	8.50753045	8.58296905	8.65916186	8.73611590
9	9.18211583	9.36852727	9.55933169	9.65641224	9.75462843	9.85399300	9.95451880
10	10.22802641	10.46221254	10.70272167	10.82539945	10.94972100	11.07570784	11.20338177
11	11.27916654	11.56683467	11.86326249	12.01484394	12.16871542	12.32491127	12.48346631
12	12.33556237	12.68250301	13.04121143	13.22510371	13.41208973	13.60222177	13.79555297
13	13.39724018	13.80932804	14.23682960	14.45654303	14.68033152	14.90827176	15.14044179
14	14.46422639	14.94742132	15.45038205	15.70953253	15.97393815	16.24370788	16.51895284
15	15.53654752	16.09689554	16.68213778	16.98444935	17.29341692	17.60919130	17.93192666
16	16.61423026	17.25786449	17.93236984	18.28167721	18.63928525	19.00539811	19.38022483
17	17.69730141	18.43044314	19.20135539	19.60160656	20.01207096	20.43301957	20.86473045
18	18.78578791	19.61474757	20.48937572	20.94463468	21.41231238	21.89276251	22.38634871
19	19.87971685	20.81089504	21.79671636	22.31116578	22.84055863	23.38534966	23.94600743
20	20.97911544	22.01900399	23.12366710	23.70161119	24.29736980	24.91152003	25.54465761
21	22.08401101	23.23919403	24.47052211	25.11638938	25.78331719	26.47202923	27.18327405
22	23.19443107	24.47158598	25.83757994	26.55592620	27.29898354	28.06764989	28.86285590
23	24.31040322	25.71630183	27.22514364	28.02065490	28.84496321	29.69917201	30.58442730
24	25.43195524	26.97346485	28.63352080	29.51101637	30.42186247	31.36740338	32.34903798
25	26.55911502	28.24319950	30.06302361	31.02745915	32.03029972	33.07316996	34.15776393
26	27.69191059	29.52563150	31.51396896	32.57043969	33.67090572	34.81731628	36.01170803
27	28.83037015	30.82088781	32.98667850	34.14042238	35.34432383	36.60070590	37.91200073
28	29.97452200	32.12909669	34.48147867	35.73787977	37.05121031	38.42422178	39.85980075
29	31.12439461	33.45038766	35.99870085	37.36329267	38.79223451	40.28876677	41.85629577

ACCUMULATION. TABLE IX—PART 1.—*Continued*

Years	½%	1%	1½%	1¾%	2%	2¼%	2½%
30	32.28001658	34.78489153	37.53868137	39.01715029	40.56807921	42.19526402	43.90270316
31	33.44141666	36.13274045	39.10176159	40.69995042	42.37944079	44.14465746	46.00027074
32	34.60862375	37.49406785	40.68828801	42.41219955	44.22702961	46.13791226	48.15027751
33	35.78166686	38.86900853	42.29861233	44.15441305	46.11157020	48.17601528	50.35403445
34	36.96057520	40.25769862	43.93309152	45.92711527	48.03380160	50.25997563	52.61288531
35	38.14537807	41.66027560	45.59206789	47.73083979	49.99447763	52.39082508	54.92820744
36	39.33610496	43.07687836	47.27596921	49.56612949	51.99436719	54.56961864	57.30141263
37	40.53278549	44.50764714	48.98510874	51.43353675	54.03425453	56.79743506	59.73394794
38	41.73544942	45.95272361	50.71988538	53.33362365	56.11493962	59.07537735	62.22729664
39	42.94412666	47.41225085	52.48068366	55.26696206	58.23723841	61.40457334	64.78297906
40	44.15884730	48.88637336	54.26789391	57.23413390	60.40198318	63.78617624	67.40255354
41	45.37964153	50.37523709	56.08191232	59.23573124	62.61002284	66.22136521	70.08761737
42	46.60653974	51.87898946	57.92314100	61.27235654	64.86222330	68.71134592	72.83980781
43	47.83957244	53.39777936	59.79198812	63.34462278	67.15946777	71.25735121	75.66080300
44	49.07877030	54.93175715	61.68886794	65.45315367	69.50265712	73.86064161	78.55232308
45	50.32416415	56.48107472	63.61420096	67.59858386	71.89271027	76.52250605	81.51613116
46	51.57578497	58.04588547	65.56841398	69.78155908	74.33056447	79.24426243	84.55403443
47	52.83366390	59.62634432	67.55194018	72.00273637	76.81717576	82.02725834	87.66788530
48	54.09783222	61.22260777	69.56521929	74.26278425	79.35351927	84.87287165	90.85958243
49	55.36832138	62.83483385	71.60869758	76.56238298	81.94058966	87.78251126	94.13107199
50	56.64516299	64.46318218	73.68282804	78.90222468	84.57940145	90.75761776	97.48434879
55	63.12577496	72.85245735	84.52959893	91.23016259	98.58653365	106.66788460	115.55092136
60	69.77003051	81.66966986	96.21465171	104.67521588	114.05153942	124.45043493	135.99158995
65	76.58206184	90.93664882	108.80277215	119.33861370	131.12615541	144.32559477	159.11833027
70	83.56610549	100.67633684	122.36375295	135.33075826	149.97791114	166.53961758	185.28411421
75	90.72650500	110.91284684	136.97278063	152.77205601	170.79177276	191.36773536	214.88829705
80	98.06771357	121.67152172	152.71085247	171.79382424	193.77195780	219.11756877	248.38271265
85	105.59429685	132.97899715	169.66522551	192.53927976	219.14393897	250.13293857	286.27858955
90	113.31093580	144.86326746	187.92990038	215.16461718	247.15665632	284.79812555	329.15425328
95	121.22242954	157.35375501	207.60614246	239.84018495	278.08495978	323.54263177	377.66415398
100	129.33369842	170.48138294	228.80304330	266.75176789	312.23230591	366.84650213	432.54865404

ACCUMULATION. TABLE IX—PART 2

To ascertain the fund which will accumulate during a period of years, when an amount is laid aside yearly at a given rate of interest compounded annually, multiply the amount laid aside by the figures in the following table in the column appropriate for the interest rate assumed, and in the line opposite the number of years the annual payment is allowed to accumulate.

Years	2½%	3%	3½%	4%	4½%	5%	6%
1	1.	1.	1.	1.	1.	1.	1.
2	2.0275	2.03	2.035	2.04	2.045	2.05	2.06
3	3.08325625	3.0909	3.106225	3.1216	3.137025	3.1525	3.1836
4	4.16804580	4.183627	4.21494288	4.246464	4.27819113	4.310125	4.374616
5	5.28266706	5.30913581	5.36246588	5.41632256	5.47070973	5.52563125	5.63709296
6	6.42794040	6.46840988	6.55015218	6.63297546	6.71689166	6.80191281	6.97531854
7	7.60470676	7.66246218	7.77940751	7.89829448	8.01915179	8.14200845	8.39383765
8	8.81383825	8.89233605	9.05168677	9.21422626	9.38001362	9.54910688	9.89746791
9	10.05621880	10.15910613	10.36849581	10.58279531	10.80211423	11.02656432	11.49131598
10	11.33276482	11.46387931	11.73139316	12.00610712	12.28820937	12.57789254	13.18079494
11	12.64441585	12.80779569	13.14199192	13.48635141	13.84117879	14.20678716	14.97164264
12	13.99213729	14.19202956	14.60196164	15.02580546	15.46403184	15.91712652	16.86994120
13	15.37692107	15.61779045	16.11303030	16.62683768	17.15991327	17.71298285	18.88213767
14	16.79978639	17.08632416	17.67698636	18.29191119	18.93210937	19.59863199	21.01506593
15	18.26178052	18.59891389	19.29568088	20.02358764	20.78405429	21.57856359	23.27596988
16	19.76397948	20.15688130	20.97102971	21.82453114	22.71933673	23.65749177	25.67252808
17	21.30748892	21.76158774	22.70501575	23.69751239	24.74170689	25.84036636	28.21287976
18	22.89344487	23.41443537	24.49969130	25.64541288	26.85508370	28.13238467	30.90565255
19	24.52301460	25.11686844	26.35718050	27.67122940	29.06356246	30.53900391	33.75999170
20	26.19739750	26.87037449	28.27968181	29.77807858	31.37142277	33.06595410	36.78559120
21	27.91782593	28.67648572	30.26947068	31.96920172	33.78313680	35.71925181	39.99272668
22	29.68556615	30.53678030	32.32890215	34.24796979	36.30337795	38.50521440	43.39229028
23	31.50191921	32.45288370	34.46041373	36.61788858	38.93702996	41.43047512	46.99582769
24	33.36822199	34.42647022	36.66652821	39.08260412	41.68919631	44.50199887	50.81557735
25	35.28584810	36.45926432	38.94985669	41.64590829	44.56521015	47.72709882	54.86451200
26	37.25620892	38.55304225	41.31310168	44.31174462	47.57064460	51.11345376	59.15638272
27	39.28075467	40.70963352	43.75906024	47.08421440	50.71132361	54.66912645	63.70576568
28	41.36097542	42.93092252	46.29062734	49.96758298	53.99333317	58.40258277	68.52811162
29	43.49840224	45.21885020	48.91079930	52.96628630	57.42303316	62.32271191	73.63979832

ACCUMULATION. TABLE IX—PART 2.—*Continued*

Years	2½%	3%	3½%	4%	4½%	5%	6%
30	45.69460630	47.57541571	51.62267728	56.08493775	61.00706966	66.43884750	79.05818622
31	47.95121003	50.00267818	54.42947098	59.32833526	64.75238779	70.76078988	84.80167739
32	50.26986831	52.50275852	57.33450247	62.70146867	68.66624524	75.29882937	90.88977803
33	52.65228969	55.07784128	60.34121005	66.20952742	72.75622628	80.06377084	97.34316471
34	55.10022765	57.73017652	63.45315240	69.85790851	77.03025646	85.06695938	104.18375460
35	57.61548391	60.46208181	66.67401274	73.65222486	81.49661800	90.32030735	111.43477987
36	60.19990972	63.27594427	70.00760318	77.59831385	86.16396581	95.83632272	119.12086666
37	62.85540724	66.17422259	73.45786930	81.70224640	91.04134427	101.62813886	127.26811866
38	65.58393094	69.15944927	77.02889472	85.97033626	96.13820476	107.70954580	135.90420578
39	68.38748904	72.23423275	80.72490604	90.40914971	101.46442398	114.09502309	145.05845813
40	71.26814499	75.40125973	84.55027775	95.02551570	107.03032306	120.79977424	154.76196562
41	74.22801898	78.66329753	88.50953747	99.82653633	112.84668760	127.83976295	165.04768356
42	77.26928950	82.02319645	92.60737128	104.81959778	118.92478854	135.23175110	175.95054457
43	80.39419496	85.48389234	96.84862928	110.01238169	125.27640402	142.99333866	187.50757724
44	83.60503532	89.04840911	101.23833130	115.41287696	131.91384220	151.14300559	199.75803188
45	86.90417379	92.71986139	105.78167290	121.02939204	138.84996510	159.70015587	212.74351379
46	90.29403857	96.50145723	110.48403145	126.87056772	146.09821353	168.68516366	226.50812462
47	93.77712463	100.39650095	115.35097255	132.94539043	153.67263314	178.11942185	241.09861210
48	97.35599556	104.40839598	120.38825659	139.26320604	161.58790163	188.02539294	256.56452882
49	101.03328544	108.54064785	125.60184557	145.83373429	169.85935720	198.42666259	272.95840055
50	104.81170079	112.79686729	130.99791016	152.66708366	178.50302828	209.34799572	290.33590458
55	125.32071411	136.07161972	160.94688984	191.15917299	227.91795938	272.71261833	394.17202657
60	148.80914038	163.05343680	196.51688288	237.99068520	289.49795398	353.58371788	533.12818089
65	175.70980889	194.33275782	238.76287650	294.96838045	366.23783096	456.79801118	719.08286076
70	206.51842746	230.59406374	288.93786459	364.29045876	461.86967955	588.52851071	967.93216965
75	241.80271709	272.63085559	348.53001083	448.63136652	581.04436193	756.65371848	1300.94867977
80	282.21287345	321.36301855	419.30678685	551.24497675	729.55769854	971.22882134	1746.59989137
85	328.49354837	377.85695165	503.36739448	676.09012345	914.63233612	1245.08706889	2342.98174142
90	381.49757170	443.34890365	603.20502701	827.98333354	1145.26900659	1594.60730098	3141.07518718
95	442.20166674	519.27202569	721.78081595	1012.78464845	1432.68425949	2040.69352892	4209.10424961
100	511.72444867	607.28773270	862.61165666	1237.62370461	1790.85595627	2610.02515693	5638.36805857

ANNUITY. TABLE X—PART 1

To ascertain the annuity or amount which must annually be laid aside at compound interest to create a given sum at the expiration of a given period of years, multiply said sum which it is desired to accumulate, by the figures in the column appropriate for the interest rate assumed and in the line opposite the number of years during which the amount will be annually laid aside at compound interest.

Years	½%	1%	1½%	1¾	2%	2¼%	2½%
1	1.	1.	1.	1.	1.	1.	1.
2	0.49875312	0.49751244	0.49627792	0.49566295	0.49504950	0.49443758	0.49382716
3	0.33167221	0.33002211	0.32838296	0.32756746	0.32675467	0.32594458	0.32513717
4	0.24813279	0.24628109	0.24444478	0.24353237	0.24262375	0.24171893	0.24081788
5	0.19800997	0.19603980	0.19408932	0.19312142	0.19215839	0.19120021	0.19024686
6	0.16459546	0.16254837	0.16052521	0.15952256	0.15852581	0.15753496	0.15654997
7	0.14072854	0.13862828	0.13655616	0.13553059	0.13451196	0.13350025	0.13249543
8	0.12282886	0.12069029	0.11858402	0.11754292	0.11650980	0.11548462	0.11446735
9	0.10890736	0.10674036	0.10460982	0.10355813	0.10251544	0.10148170	0.10045689
10	0.09777057	0.09558208	0.09343418	0.09237534	0.09132653	0.09028768	0.08925876
11	0.08865903	0.08645408	0.08429384	0.08323038	0.08217794	0.08113649	0.08010596
12	0.08106643	0.07884879	0.07667999	0.07561377	0.07455960	0.07351740	0.07248713
13	0.07464224	0.07241482	0.07024036	0.06917283	0.06811835	0.06707686	0.06604827
14	0.06913609	0.06690117	0.06472332	0.06365562	0.06260197	0.06156230	0.06053653
15	0.06436436	0.06212378	0.05994436	0.05887739	0.05782547	0.05678852	0.05576646
16	0.06018937	0.05794460	0.05576508	0.05469958	0.05365013	0.05261663	0.05159899
17	0.05650579	0.05425806	0.05207966	0.05101623	0.04996984	0.04894039	0.04792777
18	0.05323173	0.05098205	0.04880578	0.04774492	0.04670210	0.04567720	0.04467008
19	0.05030253	0.04805175	0.04587847	0.04482061	0.04378177	0.04276182	0.04176062
20	0.04766645	0.04541531	0.04324574	0.04219122	0.04115672	0.04014207	0.03914713
21	0.04528163	0.04303075	0.04086550	0.03981464	0.03878477	0.03777572	0.03678733
22	0.04311380	0.04086372	0.03870331	0.03765638	0.03663140	0.03562821	0.03464661
23	0.04113465	0.03888584	0.03673075	0.03568796	0.03466810	0.03367097	0.03269638
24	0.03932061	0.03707347	0.03492410	0.03388565	0.03287110	0.03188023	0.03091282
25	0.03765186	0.03540675	0.03326345	0.03222952	0.03122044	0.03023599	0.02927592
26	0.03611163	0.03386888	0.03173196	0.03070269	0.02969923	0.02872134	0.02776875
27	0.03468565	0.03244553	0.03031527	0.02929079	0.02829309	0.02732188	0.02637687
28	0.03336167	0.03112444	0.02900108	0.02798151	0.02698967	0.02602525	0.02508793
29	0.03212914	0.02989502	0.02777878	0.02676424	0.02577836	0.02482081	0.02389127

ANNUITY. TABLE X—PART 1.—*Continued*

Years	½%	1%	1½%	1¾%	2%	2¼%	2½%
30	0.03097892	0.02874811	0.02663919	0.02562975	0.02464992	0.02369934	0.02277764
31	0.02990304	0.02767573	0.02557430	0.02457005	0.02359635	0.02265280	0.02173900
32	0.02889453	0.02667089	0.02457710	0.02357812	0.02261061	0.02167415	0.02076831
33	0.02794727	0.02572744	0.02364144	0.02264779	0.02168653	0.02075722	0.01985938
34	0.02705586	0.02483997	0.02276189	0.02177363	0.02081867	0.01989655	0.01900675
35	0.02621550	0.02400368	0.02193363	0.02095082	0.02000221	0.01908731	0.01820558
36	0.02542194	0.02321431	0.02115240	0.02017507	0.01923285	0.01832522	0.01745158
37	0.02467139	0.02246805	0.02041437	0.01944257	0.01850678	0.01760643	0.01674090
38	0.02396045	0.02176150	0.01971613	0.01874990	0.01782057	0.01692753	0.01607012
39	0.02328607	0.02109160	0.01905463	0.01809399	0.01717114	0.01628543	0.01543615
40	0.02264552	0.02045560	0.01842710	0.01747209	0.01655575	0.01567738	0.01483623
41	0.02203631	0.01985102	0.01783106	0.01688170	0.01597188	0.01510087	0.01426786
42	0.02145622	0.01927563	0.01726426	0.01632057	0.01541729	0.01455364	0.01372876
43	0.02090320	0.01872737	0.01672465	0.01578666	0.01488993	0.01403364	0.01321688
44	0.02037541	0.01820441	0.01621038	0.01527810	0.01438794	0.01353901	0.01273037
45	0.01987117	0.01770505	0.01571976	0.01479321	0.01390962	0.01306805	0.01226752
46	0.01938894	0.01722775	0.01525125	0.01433043	0.01345342	0.01261921	0.01182676
47	0.01892733	0.01677111	0.01480342	0.01388836	0.01301792	0.01219107	0.01140669
48	0.01848503	0.01633384	0.01437500	0.01346569	0.01260184	0.01178233	0.01100599
49	0.01806087	0.01591474	0.01396478	0.01306124	0.01220396	0.01139179	0.01062348
50	0.01765376	0.01551273	0.01357168	0.01267391	0.01182321	0.01101836	0.01025806
55	0.01584139	0.01372637	0.01183018	0.01096129	0.01014337	0.00937489	0.00865419
60	0.01433280	0.01224445	0.01039343	0.00955336	0.00876797	0.00803533	0.00735340
65	0.01305789	0.01099667	0.00919094	0.00837952	0.00762624	0.00692878	0.00628463
70	0.01196657	0.00993282	0.00817235	0.00738930	0.00666765	0.00600458	0.00539712
75	0.01102214	0.00901609	0.00730072	0.00654570	0.00585508	0.00522554	0.00465358
80	0.01019704	0.00821885	0.00654832	0.00582093	0.00516071	0.00456376	0.00402605
85	0.00947021	0.00751998	0.00589396	0.00519375	0.00456321	0.00399787	0.00349310
90	0.00882527	0.00690306	0.00532113	0.00464760	0.00404602	0.00351126	0.00303809
95	0.00824930	0.00635511	0.00481681	0.00416944	0.00359602	0.00309078	0.00264786
100	0.00773194	0.00586574	0.00437057	0.00374880	0.00320274	0.00272594	0.00231188

ANNUITY. TABLE X—PART 2

To ascertain the annuity or amount which must annually be laid aside at compound interest to create a given sum at the expiration of a given period of years, multiply said sum which it is desired to accumulate, by the figures in the column appropriate for the interest rate assumed and in the line opposite the number of years during which the amount will be annually laid aside at compound interest.

Years	2½%	3%	3½%	4%	4½%	5%	6%
1	1.	1.	1.	1.	1.	1.	1.
2	0.49321825	0.49261084	0.49140049	0.49019608	0.48899756	0.48780488	0.48543689
3	0.32433243	0.32353036	0.32193418	0.32034854	0.31877336	0.31720856	0.31410981
4	0.23992059	0.23902705	0.23725114	0.23549005	0.23374365	0.23201183	0.22859149
5	0.18929832	0.18835457	0.18648137	0.18462711	0.18279164	0.18097480	0.17739640
6	0.15557083	0.15459750	0.15266821	0.15076190	0.14887839	0.14701747	0.14336263
7	0.13149747	0.13050635	0.12854449	0.12660961	0.12470147	0.12281982	0.11913502
8	0.11345795	0.11245639	0.11047665	0.10852783	0.10660965	0.10472181	0.10103594
9	0.09944095	0.09843386	0.09644601	0.09449299	0.09257447	0.09069008	0.08702224
10	0.08823972	0.08723051	0.08524137	0.08329094	0.08137882	0.07950458	0.07586796
11	0.07908629	0.07807745	0.07609197	0.07414904	0.07224818	0.07038889	0.06679294
12	0.07146871	0.07046209	0.06848395	0.06655217	0.06466619	0.06282541	0.05927703
13	0.06503252	0.06402954	0.06206157	0.06014373	0.05827535	0.05645577	0.05296011
14	0.05952457	0.05852634	0.05657073	0.05466897	0.05282032	0.05102397	0.04758491
15	0.05475917	0.05376658	0.05182507	0.04994110	0.04811381	0.04634229	0.04296276
16	0.05059710	0.04961085	0.04768483	0.04582000	0.04401537	0.04226991	0.03895214
17	0.04693186	0.04595253	0.04404313	0.04219852	0.04041758	0.03869914	0.03544480
18	0.04368063	0.04270870	0.04081684	0.03899333	0.03723690	0.03554622	0.03235654
19	0.04077802	0.03981388	0.03794033	0.03613862	0.03440734	0.03274501	0.02962086
20	0.03817173	0.03721571	0.03536108	0.03358175	0.03187614	0.03024259	0.02718456
21	0.03581941	0.03487178	0.03303659	0.03128011	0.02960057	0.02799611	0.02500455
22	0.03368640	0.03274739	0.03093207	0.02919681	0.02754565	0.02597051	0.02304557
23	0.03174410	0.03081390	0.02901880	0.02730906	0.02568249	0.02413682	0.02127848
24	0.02996863	0.02904742	0.02727283	0.02558683	0.02398703	0.02247090	0.01967900
25	0.02833997	0.02742787	0.02567404	0.02401196	0.02243903	0.02095246	0.01822672
26	0.02684116	0.02593829	0.02420540	0.02256738	0.02102137	0.01956432	0.01690435
27	0.02545776	0.02456421	0.02285241	0.02123854	0.01971946	0.01829186	0.01569717
28	0.02417738	0.02329323	0.02160265	0.02001298	0.01852081	0.01712253	0.01459255
29	0.02298935	0.02211467	0.02044538	0.01887993	0.01741461	0.01604551	0.01357961

ANNUITY. TABLE X—PART 2.—*Continued*

Years	2½%	3%	3½%	4%	4½%	5%	6%
30	0.02188442	0.02101926	0.01937133	0.01783010	0.01639154	0.01505144	0.01264891
31	0.02085453	0.01999893	0.01837240	0.01685535	0.01544345	0.01413212	0.01179222
32	0.01989263	0.01904662	0.01744150	0.01594859	0.01456320	0.01328042	0.01100234
33	0.01899253	0.01815612	0.01657242	0.01510357	0.01374453	0.01249004	0.01027293
34	0.01814875	0.01732196	0.01575966	0.01431477	0.01298191	0.01175545	0.00959843
35	0.01735645	0.01653929	0.01499835	0.01357732	0.01227045	0.01107171	0.00897386
36	0.01661132	0.01580379	0.01428416	0.01288688	0.01160578	0.01043446	0.00839483
37	0.01590953	0.01511162	0.01361325	0.01223957	0.01098402	0.00983979	0.00785743
38	0.01524764	0.01445934	0.01298214	0.01163192	0.01040169	0.00928423	0.00735812
39	0.01462256	0.01384385	0.01238775	0.01106083	0.00985567	0.00876462	0.00689377
40	0.01403151	0.01326238	0.01182728	0.01052349	0.00934315	0.00827816	0.00646154
41	0.01347200	0.01271241	0.01129822	0.01001738	0.00886158	0.00782229	0.00605886
42	0.01294175	0.01219167	0.01079828	0.00954020	0.00840868	0.00739471	0.00568342
43	0.01243871	0.01169811	0.01032539	0.00908989	0.00798235	0.00699333	0.00533312
44	0.01196100	0.01122985	0.00987768	0.00866454	0.00758071	0.00661625	0.00500606
45	0.01150693	0.01078518	0.00945343	0.00826246	0.00720202	0.00626173	0.00470050
46	0.01107493	0.01036254	0.00905108	0.00788205	0.00684471	0.00592820	0.00441485
47	0.01066358	0.00996051	0.00866916	0.00752189	0.00650734	0.00561421	0.00414768
48	0.01027158	0.00957777	0.00830646	0.00718065	0.00618858	0.00531843	0.00389766
49	0.00989773	0.00921314	0.00796167	0.00685712	0.00588722	0.00503965	0.00366356
50	0.00954092	0.00886550	0.00763371	0.00655020	0.00560215	0.00477674	0.00344429
55	0.00797953	0.00734907	0.00621323	0.00523124	0.00438754	0.00366686	0.00253696
60	0.00672002	0.00613296	0.00508862	0.00420185	0.00345426	0.00282818	0.00187572
65	0.00569120	0.00514581	0.00418826	0.00339019	0.00273047	0.00218915	0.00139066
70	0.00484218	0.00433663	0.00346095	0.00274506	0.00216511	0.00169915	0.00103313
75	0.00413560	0.00366796	0.00286919	0.00222900	0.00172104	0.00132161	0.00076867
80	0.00354342	0.00311175	0.00238489	0.00181408	0.00137069	0.00102962	0.00057254
85	0.00304420	0.00264650	0.00198662	0.00147909	0.00109334	0.00080316	0.00042681
90	0.00262125	0.00225556	0.00165781	0.00120775	0.00087316	0.00062711	0.00031836
95	0.00226141	0.00192577	0.00138546	0.00098738	0.00069799	0.00049003	0.00023758
100	0.00195418	0.00164667	0.00115927	0.00080800	0.00055839	0.00038314	0.00017736

TABLE XI

APPROVED RATES USED IN ESTIMATING THEORETICAL DEPRECIATION
(Maintenance not included)

Property	Depreciation per cent. per year — Straight line	Authority	Remarks
Aerial Lines	5	St. Louis P. S. C.	Union Elec. L. & P. Co.
Air Brakes	5	Wisconsin P. S. C.	
Air Compressors	4–5	Traction Val. Comm.	Chicago Con. Tract. Co.
Arc Lamps	6⅔	Wisconsin P. S. C.	
	15	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
Belting	8	St. Louis P. S. C.	Union Elec. L. & P. Co.
	5	Wisconsin P. S. C.	
Boilers			
	3½–4	Traction Val. Comm.	Chicago Con. Tract. Co.
	10	B. J. Arnold	Coney Island & Brooklyn adopted by P. S. C., N. Y.
(Water Tube)	5	Henry Floy	3rd Ave. case, adopted by P. S. C., N. Y.
(Fire tube)	6⅔	Wisc. P. S. C.	
(Water tube)	5	Wisc. P. S. C.	
(Fire tube)	10	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
	6⅔	St. Louis P S. C.	Union Elec. L. & P. Co.
Bonds	5	Traction Val. Comm.	Chicago Con. Tract. Co.
	50 wearing value	Henry Floy	3rd Ave. case, adopted by P. S. C., N. Y.
	5	Wisc. P. S. C.	
Breeching and Connections	3½–10	Traction Val. Comm.	Chicago Con. Tract. Co.
Buildings			
(Brick)	1½	Traction Val. Comm.	
	2	E. G. Connette	Chicago Con. Tract. Co.
	2–4	Wisc. P. S. C.	3rd Ave. case, adopted by P. S. C., N. Y.
(Wood)	2	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
	2	St. Louis P. S. C.	Union Elec. L. & P. Co.
Cables			
Underground (high tension)	5	Henry Floy	3rd Ave. case, adopted by P. S. C., N. Y.
Underground (low tension)	50 maintenance cost	Henry Floy	3rd Ave. case, adopted by P. S. C., N. Y.
(Aerial lead covered)	6⅔	Wisconsin P. S. C.	

APPROVED RATES USED IN ESTIMATING THEORETICAL DEPRECIATION.—*Continued*

(Maintenance not included)

Property	Depreciation per cent. per year	Authority	Remarks
	Straight line		
(Underground lead covered)...	4	Wisconsin P. S. C.	
(Underground lead covered)...	5	St. Louis P. S. C.....	Union Elec. L. & P. Co
Coal and Ash Handling Machinery...	7	Traction Val. Comm....	Chicago Con. Trac. Co.
	5	Henry Floy.....	3rd Ave. case, adopted by P. S. C., N. Y.
	10	Wisconsin P. S. C.	
Condensers.....	4	Traction Val. Comm....	Chicago Con. Trac. Co.
	5	B. J. Arnold.....	Coney Island & Brooklyn adopted by P. S. C., N. Y.
	5	Henry Floy.....	3rd Ave. case, adopted by P. S. C., N. Y.
	5	Wisconsin P. S. C.	
	10	Arbitrators.....	Street Lighting Controversy, Atlanta, Ga., 1899
	6⅔	St. Louis P. S. C.....	Union Elec. L. & P. Co.
Conduits.....	1	Henry Floy.....	3rd Ave. case, adopted by P. S. C., N. Y.
	2	Wisconsin P S. C.....	
	2	St. Louis P. S. C.....	Union Elec. L. & P. Co.
Cross Arms.....	8⅓–12½	Wisconsin P. S. C.	
Engines (Steam)....	3–5	Traction Val. Comm....	Chicago Con. Trac. Co.
(Steam).....	5–7½	B. J. Arnold.....	Coney Island & Brooklyn adopted by P. S. C., N. Y.
(Steam).....	5	Henry Floy.....	3rd Ave. case, adopted by P. S. C., N. Y.
(Gas).....	6⅔	Wisconsin P. S. C.	
(Steam, slow speed).....	5	Wisconsin P. S. C.	
(Steam, high speed).....	6⅔	Wisconsin P. S. C.	
	5	Arbitrators.....	Street Lighting Controversy, Atlanta, Ga., 1899.
	6⅔	St. Louis P. S. C.....	Union Elec. L. & P. Co.
Feeders..... (W P. Insulation)	Dependent on observed wear	Traction Val. Comm....	Chicago Con. Trac. Co.
	6½	Wisconsin P. S. C.	

APPROVED RATES USED IN ESTIMATING THEORETICAL DEPRECIATION.—*Continued*

(Maintenance not included)

Property	Depreciation per cent. per year — Straight line	Authority	Remarks
Foundations—Machinery.	Same as life of apparatus supported	Trac. Val. Comm.	Chicago Con. Trac. Co.
	Same as life of apparatus supported	Henry Floy	3rd Ave. case, adopted by P. S. C., N. Y.
Fuel Oil Handling Machinery	4	Trac. Val. Comm.	Chicago Con. Trac. Co.
Generators	3–8	Trac. Val. Comm.	Chicago Con. Trac. Co.
	5	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N. Y.
	5	Henry Floy	3rd Ave. case, adopted by P. S. C., N. Y.
(Modern type)	5	Wisconsin P. S. C.	
(Obsolete type)	6⅔	Wisconsin P. S. C.	
(Steam turbo)	5	Wisconsin P. S. C.	
	10	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
	6⅔	St. Louis P. S. C.	Union Elec. L. & P. Co.
Heaters	4–6	Trac. Val. Comm.	Chicago Con. Trac. Co.
(Feed water, closed)	3½	Wisconsin P. S. C.	
(Feed water, open)	3½	Wisconsin P. S. C.	
Meters			
(Electric switchboard)	5	Wisconsin P. S. C.	
(Electric service)	6⅔	Wisconsin P. S. C.	
(Electric)	8	St. Louis P. S. C.	Union Elec. L. & P. Co.
Motors (Railway)	3½	Trac. Val. Comm.	Chicago Con. Tract. Co.
(Railway)	By inspection.	B. J. Arnold	Coney Island & Brooklyn adopted by P. S. C., N. Y.
(Railway)	5	Henry Floy	3rd Ave. case, adopted by P. S. C., N. Y.
(Railway)	5	Wisconsin P. S. C.	
	10	Arbitrators	Street Lighting Controversy, Atlanta, Ga., 1899.
Paving	50 wearing value	B. J. Arnold	Coney Island & Brooklyn adopted by P. S. C., N. Y.
	50	Henry Floy	3rd Ave. case, adopted by P. S. C., N. Y.

APPROVED RATES USED IN ESTIMATING THEORETICAL DEPRECIATION.—*Continued*

(Maintenance not included)

Property	Depreciation per cent. per year	Authority	Remarks
	Straight line		
Piping and Covering	4–4½	Traction Val. Comm....	Chicago Con. Trac. Co.
	6	B. J. Arnold.....	Coney Island & Brooklyn adopted by P. S. C., N. Y.
	5	Henry Floy.....	3rd Ave. case, adopted by P. S. C., N. Y.
	5	Wisconsin P. S. C.	
	5	Arbitrators.....	Street Lighting Controversy, Atlanta, Ga., 1899.
	6⅔	St. Louis P. S. C.....	Union Elec. L. & P. Co.
Poles (Steel).....	2	Henry Floy.....	3rd Ave. case, adopted by P. S. C., N. Y.
(Wood in concrete).....	5	Wisconsin P. S. C.	
(Wood in earth)..	5½–8½	Wisconsin P. S. C.	
(Iron).....	2½	Wisconsin P. S. C.	
(Wooden).....	10	Arbitrators.....	Street Lighting Con., Atlanta, Ga., 1899.
Pumps.....	5	Traction Val. Comm....	Chicago Con. Trac. Co.
	5	B. J. Arnold.....	Coney Island & Brooklyn, adopted by P. S. C., N. Y.
	5	Henry Floy.....	3rd Ave. case, adopted by P. S. C., N. Y.
(Small steam)....	6⅔	Wisconsin P. S. C.	
	5	Arbitrators.....	Street Lighting Con., Atlanta, Ga., 1899.
	6⅔	St. Louis P. S. C.....	Union Elec. L. & P. Co.
Rolling Stock			
(Open car bodies).	4	Trac. Val. Comm.....	Chic. Con. Tract. Co.
(Open trailer bodies).....	4	Trac. Val. Comm.....	Chic. Con. Tract. Co.
(Closed car bodies).....	5	Trac. Val. Comm.....	Chic. Con. Tract. Co.
(Trucks).....	3½	Trac. Val. Comm	Chic. Con. Tract. Co.
(Closed and open cars).....	5	B. J. Arnold.....	Coney Island & Brooklyn, adopted by P. S. C., N. Y.
(Trucks).....	5	B. J. Arnold.....	Coney Island & Brooklyn adopted by P. S. C., N. Y.
	5	Henry Floy.....	3rd Ave. case, adopted by P. S. C., N. Y.
(Car bodies and equipment).....	6⅔	Wisconsin P. S. C.	
Stack.....	3	Traction Val. Comm....	Chicago Con. Tract. Co.
(Steel).....	10	B. J. Arnold.....	Coney Island & Brooklyn adopted by P. S. C., N. Y.

APPROVED RATES USED IN ESTIMATING THEORETICAL DEPRECIATION.—*Continued*

(Maintenance not included)

Property	Depreciation per cent. per year	Authority	Remarks
	Straight line		
Stokers.			
(Fixed parts).....	5	Traction Val. Comm....	Chicago Con. Tract. Co.
(Moving parts)...	20	Traction Val. Comm....	Chicago Con. Tract. Co.
Storage Batteries....	5	Henry Floy.....	3rd Ave. case, adopted by P. S. C., N. Y.
	6⅔	Wisconsin P. S. C.....	
	5	St. Louis P. S. C.....	Union Elec. L. & P. Co.
Switchboard and Wiring	3	Traction Val. Comm....	Chicago Con. Tract. Co.
	6	B. J. Arnold.....	Coney Island & Brooklyn adopted by P. S. C., N. Y.
	5	Henry Floy.....	3rd Ave. case, adopted by P. S. C., N. Y.
(Modern type)...	5	Wisconsin P. S. C.	
(Obsolete type)...	6⅔	Wisconsin P. S. C.	
	8	St. Louis P. S. C.....	Union Elec. L. & P. Co.
Telephones.....	10	Wisconsin P. S. C.	
Track (Rail Joints).	5	Tract. Val. Comm.....	Chicago Con. Tract. Co.
(Ties).....	5	Tract. Val. Comm.....	Chicago Con. Tract. Co.
(Rails).....	Dependent on observed wear	Tract. Val. Comm.....	Chicago Con. Tract. Co.
(Special work)...	Dependent on		
(Straight and special work)...	observed wear	Tract. Val. Comm.....	Chicago Con. Tract. Co.
	50 wearing value.	B. J. Arnold.....	Coney Island & Brooklyn adopted by P. S. C., N. Y.
(Straight and special work)...	50 wearing value.	Henry Floy.....	3rd Ave. case, adopted by P. S. C., N. Y.
(Special work)...	8⅓	Wisconsin P. S. C.	
(Straight track)..	5½	Wisconsin P. S. C.	
Transformers			
(Station Service).	5	Wisconsin P. S. C.	
	6⅔	Wisconsin P. S. C.	
	6⅔	St. Louis P. S. C.....	Union Elec. L. & P. Co.
Turbines			
(Steam).....	5	Wisconsin P. S. C.	
(Water).....	3½	Wisconsin P. S. C	
(Steam).....	6⅔	St. Louis P. S. C.....	Union Elec. L. & P. Co.

APPROVED RATES USED IN ESTIMATING THEORETICAL DEPRECIATION.—*Concluded.*

(Maintenance not included)

Property	Depreciation per cent. per year	Authority	Remarks
	Straight line		
Wire			
Trolley Allowance of 80.5 lbs. per 1000 ft. for wearing value. of No 1/0 wire		Tract. Val. Comm.	Chicago Con. Tract. Co.
Trolley Allowance of 106.8 for No. 2/0		Tract. Val. Comm.	Chicago Con. Tract. Co.
	From observation	B. J. Arnold	Coney Island & Brooklyn, adopted by P. S. C., N. Y.
W. P.	50 maintenance cost	Henry Floy	3rd Ave. case, adopted by P. S. C., N. Y.
Trolley 1/0 under 1 minute headway	50	Wisconsin P. S. C.	
Trolley 2/0 under 1 minute headway	40	Wisconsin P. S. C.	
Trolley 3/0 under 1 minute headway	33⅓	Wisconsin P. S. C.	
W. P.	6⅔	Wisconsin P. S. C.	
W. P	7½	Arbitrators	Street Lighting Con., Atlanta, Ga., 1899.

Depreciation Accounts or Reserve Funds.—A recognition of the various classes of depreciation continuously at work on physical property with the means taken to compensate for deterioration or the conservation of the original investment, whether through expenditures made as a part of regular operating expense or from accumulated funds or even through assessments on investors—provided capitalization is not thereby increased—has no necessary connection with the bookkeeping classification of the expenses or the amounts that may or may not have accumulated in reserve funds. While wear and tear have commonly been borne as a part of operating expense, it is equally important that the other classes of depreciation, or annual provision for accruing deterioration, be made a part of the cost of operation if the investment is to remain intact. In all cases involving a consideration of the expenses of keeping a property in operation, there should invariably be included allowances to cover all ultimate depreciation and replacement. For a small company or where relatively large proportions of the invested capital are locked up in few or single pieces of property, it is preferable to accumulate, in advance out of operating income, reserve funds from which to provide for all classes of deprecia-

tion. But such method may be unnecessary and possibly an inexpedient accounting complexity with large corporations, where the investments in any single piece of physical property are small relative to the total investment. The truth of the above will be at once recognized from the following illustration. If the company which erected the Metropolitan Life Insurance building had only that property, it would be essential that funds should be laid aside annually in amounts sufficient to replace the original investment at the end of the useful life of said building. On the other hand, if all the surface railways, subways and elevated railways, electric light and gas companies doing business in greater New York were a single corporation, it probably would be an entirely unnecessary and useless accounting expense to maintain depreciation accounts and funds for the various pieces of physical property. It will be seen that the replacement of a considerable percentage of the trackage or a large amount of the rolling stock or even a complete power house, in the natural course of operation, would not make such draft upon the gross income or effect the annual operating expenses to such an extent as to jeopardize the net earnings or unwarrantably increase the amounts regularly expended on account of depreciation. In brief, where the properties are large enough, depreciation becomes only normal wear and tear. In every case, however, operating expenses should be made to provide for ultimate loss in value, whether reserve funds are accumulated or all depreciation is charged to the "wear and tear account." It is on this theory that the Receiver of the Third Avenue Railway in New York City, operating a large property having numerous physical elements so that all deterioration became simply "wear and tear" and a part of operating expenses, declined to obey the order of the Public Service Commission and provided no depreciation fund whatever, simply removing deterioration when it occurred and charging it as maintenance in operating expenses. Since its reorganization the Third Avenue Company has been ordered by the Commission to set up a depreciation fund consisting of 20 per cent. of the annual gross income, but again the former Receiver now the President, has refused to comply with such an order.

It has been the too frequent practice in the past to regard wear and tear as the only elements of depreciation chargeable to the operating expense and to charge capital account in whole or

in part with expenditures for age, inadequacy and obsolescence. The error of this procedure is now almost universally recognized and the injustice of such improper handling of depreciation to both the investor and the public being served is clearly illustrated in the following example. Assume that the depreciable property of a "going concern" represents an investment of $1,000,000 upon which the average depreciation is 10 per cent. or $100,000 a year, and the interest charges at 6 per cent. amount to $60,000 a year. Consider two plans of operation first, that in which depreciation, except wear and tear, is not provided for as a part of operating expenses and that said depreciation, *i.e.*, renewals and replacements, is taken care of by the sale of additional securities. The second plan contemplates that all depreciation including wear and tear is included as a part of operating expenses. Results of the operation of these two plans will be as follows:

TABLE XII

	1st plan capital invested	2d plan capital invested	1st plan paid by consumer each year	2d plan paid by consumer each year
1st year....	$1,000,000	$1,000,000	$60,000	$160,000
2d year....	1,100,000	1,000,000	66,000	160,000
3d year....	1,200,000	1,000,000	72,000	160,000
4th year....	1,300,000	1,000,000	78,000	160,000
5th year....	1,400,000	1,000,000	84,000	160,000
6th year....	1,500,000	1,000,000	90,000	160,000
7th year....	1,600,000	1,000,000	96,000	160,000
8th year....	1,700,000	1,000,000	102,000	160,000
9th year....	1,800,000	1,000,000	108,000	160,000
10th year....	1,900,000	1,000,000	114,000	160,000
11th year....	2,000,000	1,000,000	120,000	160,000
12th year....	2,100,000	1,000,000	126,000	160,000
13th year....	2,200,000	1,000,000	132,000	160,000
14th year....	2,300,000	1,000,000	138,000	160,000
15th year....	2,400,000	1,000,000	144,000	160,000
16th year....	2,500,000	1,000,000	150,000	160,000
17th year....	2,600,000	1,000,000	156,000	160,000
18th year....	2,700,000	1,000,000	162,000	160,000
19th year....	2,800,000	1,000,000	168,000	160,000
20th year....	2,900,000	1,000,000	174,000	160,000
* * *	* * *	* * *	* * *	* * *
50th year....	5,900,000	1,000,000	354,000	160,000
		Total paid by Consumers..	$10,350,000	$8,000,000

From the above, it will be seen that, *as regards the investor*, under the second plan, he has his security unimpaired at the

end of the life of the apparatus; and under the first plan, the capitalization is constantly increasing and before many years, it equals an amount several times that of the actual security. *As regards the consumer*, under the second plan he apparently saves over $2,000,000 or 25 per cent. of the cost for exactly the same service rendered him under the first plan. It may be argued that the consumer may deposit $100,000 to his credit in the bank the first year, $94,000 the second year, and so on, thus having a sum at interest which will help carry the increased charges of later years. Even so his money must be tied up eternally and is therefore useless to him.

Application of Depreciation.—In considering the subject of depreciation, it should be clearly understood and appreciated that the term is used with two entirely distinct and separate meanings as follows:

1. *Rate of Depreciation.*—In the determination of an annual rate of deterioration, which is continuously reducing the worth of the property and may be desired merely for the purpose of estimating the proper amount to lay aside yearly in reserve funds. In this use of "depreciation," there is not usually included the amount of deterioration taken care of as a part of the regular operating expenses; that is, wear and tear, the term generally refers only to the deterioration due to age or inadequacy or obsolescence—any one of these terms but not the sum of them.

2. *Total of Depreciation.*—In determining the total estimated deterioration of property at a given period, which amount is obtained for the purpose of deducting it from the cost—new or reproduction—to obtain present value. In this use of the term, which is really the condition of being deteriorated, there may be included a consideration of all classes of depreciation; wear and tear, age, inadequacy, obsolescence, and deferred maintenance.

There has been such marked development and improvement in all mechanical appliances, particularly along the electrical lines, that inadequacy and obsolescence have usually come into effect before age, and in consequence, knowledge of the depreciation of all electrical properties due to age has not yet been fully established. This results from the fact that the amount of data relating to electrical properties which is available, showing by specific reference the date both of installation and abandonment through "age" is remarkably small. It should be widely collected and correlated.

The determination of depreciation due to inadequacy and obsolescence is a particularly delicate matter, it depends so largely on local conditions and especially upon individual judgment and equipoise. Inadequacy and obsolescence usually develop so quickly that very frequently the property in question becomes inadequate or obsolete within a few weeks or months, and has depreciated to scrap value almost as soon as these classes of depreciation are recognized; a space of time entirely too brief in which to apply ordinary methods of offsetting depreciation. Thus it will be recognized that an attempt to prognosticate on inadequacy and obsolescence over considerable periods in advance of their appearance is little more than a guess, even by the most experienced.

There is urgent necessity for coöperation by manufacturers, consulting engineers and operators of public utility properties for the purpose of collecting data available as to the depreciation of physical property of all classes used by public utilities. The information should be so collected as to make clear the causes of depreciation and the rate at which it has progressed. For example, wear and tear would probably have to become subdivided into maintenance and accident, otherwise a serious accident would make abnormal increase in the wear and tear deterioration. Obsolescence might be divided so as to show whether the obsolescence was caused by city ordinance or the invention of new apparatus. In obtaining age depreciation, care must be exercised that the apparatus is abandoned through exhaustion of life, not through inadequacy or obsolescence.

In determining the total amount of deterioration due to inadequacy and obsolescence, only those elements of the property which have clearly and unequivocally so depreciated should be written off to this account, because as previously stated, opinions of engineers on this subject may differ honestly but widely. On the other hand, in determining the rate of depreciation for making provision covering inadequacy and obsolescence, the leaning should be to the other side; that is, the engineer should be sure to provide a rate high enough to take care of these classes of depreciation out of the operating income; for the reason that in this case, the expert is endeavoring to forestall the future and he must be conservative in protecting the property; otherwise, a sudden development of inadequacy or obsolescence will result in an abnormal depreciation expense without funds to take care

of same. No unfairness will result from a liberal annual allowance to provide for depreciation as any too rapid accumulation of funds would result merely in a revision of the rate.

As the United States Bureau of Internal Revenue provides that reduction in value authorized for depreciation "shall include all expense items under the various heads acknowledged as liabilities," it will be seen that the proper understanding of the question of depreciation is a vital one for those connected with corporation management because if no depreciation fund is set up, nothing can be included in the cost of operation as necessary to provide for depreciation, as would be essential in a case involving rate regulation for example. Moreover, the State Public Service Commissions are now generally requiring the setting up of depreciation accounts and reserves on a basis to be decided by each corporation itself, thus necessitating a thorough understanding of the various phases of the theory of depreciation.

1. *Rate of Depreciation*—"The amount that should be charged off annually for depreciation is difficult to determine. The life of the various classes of property depends very largely upon the original quality of the same, the location, the kind of usage to which it is subjected, the amount expended for ordinary or current repairs, the promptness of these repairs, and upon other factors of this character. In addition to this, there is also the question of obsolescence, or such changes as become necessary because of new inventions or because of changes in the art. In the electrical field in particular such changes are very frequent. * * * It is usually held that from 5 to 10 per cent. on the investment is required yearly to meet depreciation of all kinds, depending upon conditions. When current repairs are light, it is probable that the amount to be set aside will closely approach the latter figure; when current repairs are heavy and the property kept in good condition, the former figure may be sufficient. A great deal depends upon the conditions under which the plant is operating. It is probable that the actual amount that is needed by any particular plant can be determined only through experience and by a close study of all the facts involved."[1]

The manner of determining the amount to be set aside for annual depreciation varies, there being three general methods recognized.

a. An estimate based on a percentage of the cost of the property being depreciated. Said percentage is such that either on

[1] Decision of the Railroad Commission of Wisconsin, June 2, 1908. City of Dodgeville *vs*. Dodgeville Electric Light & Power Co.

a straight line or one of the sinking fund bases heretofore described it will be sufficient to provide a fund which, together with the scrap value, will replace the property in question. Such method of providing depreciation funds has been adopted for example by the Madison (Wisc.) Gas and Electric Co. The Special Master in the Columbus, Ohio case held that the amount of operating expenses chargeable to depreciation should be

"5 per cent. of the total cost of the plant including real estate, real estate constituting but 7 per cent. of the total valuation."[1]

The present laws of Massachusetts provide in respect to municipally owned gas or electric plants, that there shall be included an amount for

"depreciation equal to 3 per cent. of the cost of the plant exclusive of land and water power appurtenant thereto."

b. A fixed percentage of the gross earnings. This is a very convenient and quite widely used method. It has the advantage of regulating the amount provided for depreciation in accordance with the gross income but a fund so provided, may have no proper relation to the deterioration actually taking place in the property because it is fixed entirely independently of the invested values. This method is sometimes taken to include wear and tear and sometimes not. The practice in this regard is illustrated by the practice of the companies in the following Table XIII:

TABLE XIII

Name of company	Per cent. of gross revenue expended or appropriated for	
	Maintenance	Depreciation
Milwaukee companies:		
Railway departments	11.3	9.9
Gas, electric light and steam heat departments	6.15	8.12
United Railways Company of St. Louis	13.67	10.0
Union Electric Light & Power Co., St. Louis	4.95	16.0
Suburban Electric Light & Power Co	7.10	10.85
Detroit Edison Company and subsidiaries	6.45	10.23
Omaha & Council Bluffs Street Railway Co	7.00	10.0
Chicago Street Railways	6.00	8.0
Philadelphia Rapid Transit Co	Undivided 15.	

[1] Columbus Railway and Light Company *vs.* City of Columbus, Report of Special Master in the Circuit Court of U. S. Southern District, of Ohio, Eastern Division, page 43.

c. On the basis of kilowatt-hours output or car-miles run. For example the New York Edison Company charges off monthly for renewals and replacements, etc., an amount equal to 1 (per) cent. per kilowatt hour on current sold to general consumers in addition to wear and tear. In Cleveland, 5 cents per car mile is provided to cover both maintenance and other deterioration. In Brooklyn, the subsidiaries of the Brooklyn Rapid Transit System allow amounts varying from 2.7 cents to 4.4 cents per car mile for equipment of surface roads and from 1.4 cents to 2 cents per car mile for equipment of either elevated or partly elevated railways; from 2.2 cents to 2.4 cents per car mile for way and structures for surface roads; from 1.1 cents to 1.8 cents for elevated or partly elevated railways, to cover not only obsolescence, inadequacy, renewals and replacements but also repairs and maintenance.

In estimating depreciation where approximate results only are desired, it is quicker and more convenient to disregard scrap value and consider only cost in determining the principle to which the rate of depreciation or the amount of depreciation obtained is to be applied. The better and more refined method is to consider scrap value, which must first be deducted from the cost, and the remainder used as the principal to which to apply the rate to obtain the amount of depreciation.

2. *Total Depreciation.*—In order to determine at any given time the total amount of depreciation that has taken place in physical property, the cost—either original or reproduction—must be determined and from this subtract the total estimated amount of depreciation. In determining the total sum of depreciation, all articles or property included in the inventory, which are not reasonably held for future expansion of the business or held at scrap value, awaiting sale, which have been "laid aside and thrown away" and for which "new machinery and new construction has been substituted,"[1] together with such deterioration as results from wear and tear and existing inadequacy or obsolescence and any deferred maintenance, must be taken in order to obtain the aggregate absolute depreciation. From the cost should then be deducted this absolute depreciation in order to obtain the present, real or service value of the property. If it

[1] People ex rel. Binghamton Light, Heat and Power Co. *vs.* Stevens Appellate Division, New York, Third Dept., March Term, 1911. (Not reported.)

is desired to go further than this and obtain a theoretically depreciated value, as has been done in many instances, the absolute depreciation determined, as above, must be increased by a theoretical depreciation determined by the use of estimated amounts of deterioration in accordance with curves 3, 4 or 5 of Fig. 5, or some other preferred method, to cover assumed deterioration for age and non-existent but expected, inadequacy or obsolescence.

In determining the value of the physical property at any given time, the theoretical depreciated condition is obtained by consideration of the following items:

A Cost to reproduce, or original cost.
B Scrap value.
C Wearing value.
D Wear and tear.
E Age.
F Inadequacy.
G Obsolescence.
H Deferred maintenance.
I Remaining wearing value.
J Present value.

$$C = A \text{ minus } B$$

$$I = C \text{ minus } \left(D + \left\{ \begin{array}{c} E \\ \text{or} \\ F \\ \text{or} \\ G \end{array} \right\} + H\right)$$

$$J = I + B$$

In obtaining the "remaining wearing value" (*I*), it will be noted that "age" or "inadequacy" or "obsolescence" (*E* or *F* or *G*) is used in the formula, but not the sum of these quantities. The reason for this will be recognized from a consideration of the accompanying diagram, Fig. 7.

Let *O C*, that is *B D* equal scrap value, and *O A*, the cost, either original cost or cost to reproduce new. Assuming the line *O B*, that is, *C D*, represents the length of life of the property under consideration, the line 2 represents "theoretical" depreciation due to age, on a "straight line" basis (which may well be replaced by either sinking fund method—curves 4 and 5 of Fig. 5), and this element, age, would ordinarily be the rate

of depreciation used unless inadequacy or obsolescence comes into effect. For the purpose of illustration, assume that line 1 represents rate of depreciation due to inadequacy and line 3 depreciation due to obsolescence. At a glance it will be seen that as the apparatus in question would be abandoned because of inadequacy some five years before, it would be abandoned for age, and as it would become decrepit and have to be abandoned on that account before obsolescence came into play, that

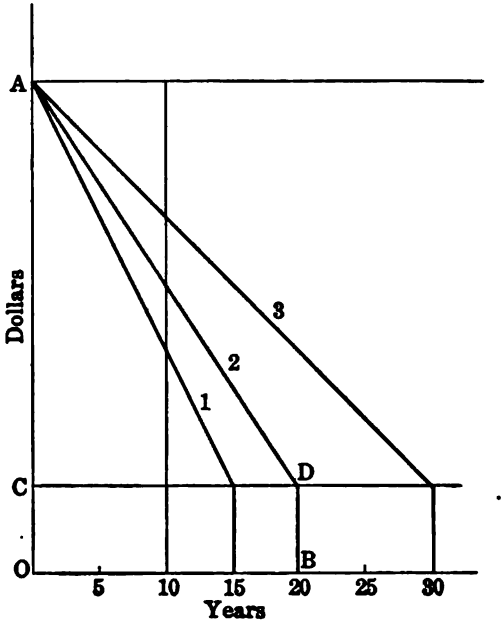


FIG. 7.

inadequacy alone of the three classes of depreciation under consideration is to be taken into account. At a given period, say 10 years, from installation, the vertical distance from the point indicating 10 years, will indicate by intersection with the proper curve, the theoretical amount of obsolescence, age and inadequacy; but the sum of these would be greater than the original cost showing clearly that the depreciation which will first cause the abandoning of the article in question, should alone be considered, in addition to wear and tear, and deferred maintenance.

The above sets forth the general method of applying the theory of depreciation when the proper and total amount of

deterioration is obtained, without regard to whether one is considering the sales value, service value, or theoretical depreciation. It is office work entirely; but on the other hand, the determination of the amount of depreciation in a given property is not office work and not principally so. All authorities agree that no exact estimate of the amount of depreciation of physical property could be obtained without personal, visual examination supported by broad experience and sound judgment; and it is for this reason, because of the personal equation, that experts differ so widely as to results.

The fallacy of attempting to determine absolute present value by deducting from the cost to reproduce new or original cost, the value at a given age, as indicated by curves 3, 4 or 5, in Fig. 8, will be at once apparent from a consideration of the following:

Assume that the "present value" of a given piece of property is desired, which has an estimated life of 20 years, 10 years having already expired. If at the several points there be taken on curves 3, 4 and 5, respectively represented by the "straight line" and "sinking fund" methods, the depreciation of the same property at the same time, we have three decidedly different values depending on which curve is used, and if three different engineers estimating the present value, each adopt a different curve, they are prepared to go on the stand and testify to three different values of the property in question, which of course, is an absurdity and makes them ridiculous. As a matter of fact, the apparatus in question can have only one value or another neither of which will depend on the method adopted for accumulating funds for which all these curves are useful; but upon whether the apparatus is being valued for what it would bring when sold for use elsewhere, as shown by curves 1 and 2, or its worth for use in connection with the purpose for which it was installed, as may be shown by curve 6, or its cost of replacement.

Very many authorities agree that in making an estimate of the amount of depreciation effective in any property, "used or useful," there should at least be included in the amount to be deducted, an estimate of the amount of wear and tear, deferred maintenance, if any, also scrap value of property that has been worn out or superseded as well as inadequate or obsolete property provided it is still inventoried.

"Where equipment not actually part of the producing plant has been retained and serves as an emergency or reserve unit, it is properly included as property used and useful in serving the public. Equipment, however, which has been cast aside for larger units, more adapted to the present use of the plant, or which has been abandoned as impracticable, cannot be included as a part of the valuation serving as a basis for adjustment of rates."[1]

The only allowable exception to the inclusion of inadequate or obsolete property as a part of depreciation, is where inadequacy or obsolescence has so suddenly and largely effected a property that its earnings have not permitted the writing off, at the time or since, such developed depreciation; then in such cases it may be that capitalization or earning basis should not be reduced by taking account of any such depreciation. This principle has been established by the United States Circuit Court where it held that in considering the cost of reproduction new, $2,000,000, the value of old street railways that had been replaced, should be allowed for and included.[2]

A similar view was expressed by the Supreme Court in the opinion written by Justice Brewer in 1894.

"It is not always reasonable to cast the entire burden of the depreciation on those who have invested their money in railroads. Take the Union Pacific Railway, for illustration. At the time the government created the corporation, to induce the building of this transcontinental road through a largely unoccupied territory, it loaned to the company $16,000 a mile; taking as security therefor a second lien on the property and granting to the corporation the right to create a prior lien to an equal amount, which was done. There is testimony tending to show that the road in Nebraska could be built to-day for $20,000 a mile. Would it be full justice to the government, would it satisfy the common sense of right and wrong, would it be reasonable, for the State of Nebraska to so reduce the rates that the earnings of the road would only pay ordinary interest on $20,000 a mile, and so, the holders of the first lien being paid their interest, the government be forced to be content with only interest on one-fourth of its investment? Or, to put the case in a little stronger light, suppose the promoter of this enterprise had been some private citizen who had advanced his $16,000 a mile as the

[1] In re-Application of the Darlington Electric Light and Water Power Company for Authority to Increase Rates. Decision and Order of Railroad Commission of Wisconsin, June 17, 1910.

[2] U. S. Circuit Court in the Milwaukee Electric Railway and Light Co. *vs.* City of Milwaukee, 87 Fed. 577.

second lien, and that the road could be constructed to-day for only $16,000 a mile. Would it be reasonable and just to so reduce rates as to simply pay to the holders of the first lien reasonable interest, and leave him without any recompense for his investment?"[1]

Whether or not "theoretical depreciation" should be included as part of the total depreciation in determining fair value of physical property is a mooted question. The Public Service Commissions have rather leaned to the opinion that such depreciation should be considered in determining fair value. On the other hand, many, if not all, of the court decisions are against such inclusion of theoretical depreciation. This is indicated by the decision of the Supreme Court sustaining the Master's opinion in the famous Consolidated Gas case of New York City. The Master says, regarding the testimony of the expert for the plaintiff, Mr. Marks, and for the defendant, Mr. Mayer, that

"Mr. Marks did not particularly regard the extent of depreciation actually existing, but assumed a theoretical deterioration of the supposed life of the plant. He testified:

> 'Depreciation results from several causes. The most ordinary one is decay or wear and tear, as observed. There is another factor which is inadequacy, owing to the increase of the business. There is also another cause of depreciation, obsolescence, which is due to the changes in the arts and in the methods and in the general growth of scientific knowledge; if a works built at a certain period is kept in perfect repair, meaning by that, always restored to their original condition, and in good working condition, there remains, assuming that, a depreciation due to both obsolescence and to inadequacy.'

"In this view he made estimates on the theory of the cost of final replacement to cover such inadequacy or obsolescence, ranging from 25 per cent. to 60 per cent. and based on a supposed life of 120 years for the plant. The discrepancy between his valuations and those of Mr. Mayer is largely due to their different methods of estimating depreciation. He said:

> 'Mr. Mayer does not differ largely from my own figures of structural cost. You may say for all ordinary purposes they coincide, with the exception of the gas holders and even there they do not differ largely. It is the question of depreciation entirely.'

[1] Ames *vs.* Union Pacific Railway Company, 64 Fed. 165.

"As will hereafter appear, it is proper in the administration of a manufacturing plant to take depreciation of the character above described into account and provide against it by setting aside a reserve fund from current earnings. For the purpose of determining present value, however, particularly on the basis of cost of reproduction, the method followed by Mr. Marks does not commend itself. It appears from the record, without substantial dispute, that while certain of the plants and apparatus may not be in perfect repair, they are as a whole in efficient operating condition, and that a large proportion of their capacity is represented by the latest pattern of water gas apparatus installed within the last few years. * * *

"The fact thus being that the plants are in good order and operating efficiently, it does not appear reasonable, for the purposes of this case, to charge them with a theoretical deficiency so great, as, if actually existing, would make their successful operation a practical impossibility. An estimate of depreciation like those of Mr. Edgerton and Mr. Mayer, based on a detailed examination of the property as it stands to-day, affords in my opinion a more fair and practicable method to be followed in determining its value."[1]

From the above, which is probably as full an exposition of the proper basis for estimating depreciation as ever passed by the Supreme Court, several important points would seem to be made clear:

a. Depreciation should be determined by personal inspection rather than by theoretical estimate.

b. Property that is in good order and operating efficiently, although not new, need not necessarily be depreciated, at least in rate cases.

The decision of the Supreme Court in the Consolidated Gas case has not been given due consideration in the matter of depreciation as against the same court's decision in the Knoxville Water case, although both decisions were rendered the same day. In the writer's opinion there is no contradiction between these decisions as to the meaning of "fair value" or method of allowing for depreciation if the decisions are fairly interpreted.

An examination of the Master's Report in the Knoxville case shows that in obtaining the value of the property on which he estimated the rate of return, he used higher unit prices than the average; he included over $22,000 worth of service connec-

[1] Master's Report, Consolidated Gas Co. of New York. Filed June 24, 1907.

tions, which had been donated by the water consumers; also $2000 as a "contingent allowance for bad bottom," and he did not make any deduction for wear and tear, deferred maintenance, inadequacy or obsolescence, adding the sum of both complete and incomplete depreciation to the estimated value of the surviving plant in order to obtain the value which he used as the basis of rates. As the Supreme Court clearly states, it did not attempt to decide how much of the Master's value of the tangible property should have been diminished by the depreciation which the property had undergone, stating it would be improper that "the amounts of complete and incomplete depreciation should be added to the present value of the surviving parts" in order to obtain the total plant value to be used as a basis of rate making. This position is further explained by the following quotation:

"The cost of reproduction is one way of ascertaining the present value of a plant like that of a water company, but that test would lead to obviously incorrect results if the cost of reproduction is not diminished by the depreciation which has come from age and use."[1]

Is it not clear that in this case the Supreme Court consistent with its decision in the Consolidated Gas case was pointing out that such deterioration as that due to complete depreciation also "use" that is, wear and tear, also deferred maintenance, inadequacy, obsolescence, age—in the sense that the life had completely expired—must be estimated and deducted from replacement cost in determining fair present value? If not, and the Knoxville Water case properly construed means that present value is to be obtained by deducting the theoretical depreciation from cost, how is it made consistent with the decision in the gas case?

It would seem that however useful considerations of life of property may be in establishing annual rates of deterioration, theoretical depreciation has no place in determining the basis for fixing rates of return. If so, by what method is theoretical depreciation to be determined? At which month in the life of the physical property which extends over years is the present value to be estimated? Assume that the life of a large part of a complete property is 20 years, then at the end of 19 years and 6 months, if theoretical depreciation is considered, the present

[1] In the Knoxville Water Case (City of Knoxville *vs.* Water Company, 212 U. S., 1).

value of the property would be small and the rates based thereon would include nothing in the way of return on the large part of the property, still 100 per cent. useful, a year thereafter the property being entirely replaced and new, the rates would be incomparably higher and between these two extremes, the rates will fluctuate depending on the year or the month in which the present value is estimated. Consider two surface railways running out parallel avenues from the center of a city to the suburbs, both alike in construction but one 10 years old and the other put in operation within a year. If theoretical depreciation is considered the present values of these two properties are quite different, the older road being worth appreciably less than the new road, although the original cost of installation may have been the same in both cases. Under such circumstances, is the older road to be allowed to charge only a four-cent fare, assuming that that gives a fair return on the estimated present value, while the new road must charge a five-cent fare for the same return on its estimated value? What would be the result practically of such method of fixing rates? The old road would be swamped with business and the new road would be unable to maintain its earnings. Again, the theoretical present value of the property of a lighting company might be found to be 50 per cent. of the cost new but such value would not properly represent its worth in service to the public because it would probably be in such poor condition that continuous and satisfactory service could not be rendered and the real worth and service to the public would be very much below 50 per cent. On the other hand, through extravagant management, and the replacing of partly worn out apparatus before economically necessary and the incurrence of abnormally high maintenance charges in order to maintain the theoretical present value of the property at say 90 or 95 per cent., there would result unnecessarily high operating expenses and unwarrantable charges upon the public merely for the sake of maintaining a theoretical high present value on which a fair rate of return must be allowed. A property of this kind maintained at an abnormally high present-value worth, would be of no greater service to the public than one of which the present-value worth might be only 75 per cent., whereas the burden to the public in maintaining the former property would be very much higher than the latter. Can such fanciful and variable bases be intended by the Supreme Court to

be taken as that on which rates are to be estimated and regulated? Such conclusion would be illogical, unreasonable and unfair. Provided a property is kept in good order and at 100 per cent. working efficiency so as to render service to the public equivalent to that of a new plant, the question of rates or value of property in its service to the public has absolutely nothing to do with the amount of reserve funds the corporation may or may not have accumulated. The value of any physical property, as must of course be recognized, has no relation whatever to the amount of money a corporation may have to its credit in the bank, nor have rates for service, as far as we have ever heard, been based on the amount of a company's surplus or reserve funds. While appraiser must be quick to recognize loss of value where it actually exists and to make deductions for property that has been worn out or superseded, he should not be misled into including hypothetical or academic values.

The confused state of mind that prevails with regard to the application of depreciation in determining present value, results largely from the misapplication of principles established by the Courts in rate cases. These decisions expressly provide that allowances to cover the deterioration of all sorts including ultimate replacement, are to be provided out of operating income; citations supporting this view are too numerous to mention but a quotation from the Knoxville Water case, referred to above, is particularly pertinent in this connection.

"The company is not bound to see its property gradually waste, without making provisions out of earnings for replacement. It is entitled to see that from earnings the value of the property invested is kept unimpaired, so that at the end of any given term of years, the original investment remains as it was at the beginning."[1]

In view of the perplexed state of mind and contradictory decisions that exist, the clear thinking and fair decision of the St. Louis Public Service Commission is refreshing. The quotation is a brief summary of their method of determining present value—which did not include deductions for mere age—in fixing fair rates to be charged by the Union Electric Light and Power Company of St. Louis.

"In depreciating to arrive at the present value of the depreciable property, the Commission does not consider it fair to make deductions

[1] Knoxville *vs.* Water Company 212 U. S., 1.

for anything but the present physical condition, and for items where it is plainly apparent that the property has become obsolete or inadequate. The usual estimate of the life of different parts of a public service property, so far as they deal with obsolescence or inadequacy, are extremely problematical and these elements should not be generally taken into account in determining present value."[1]

Appreciation.—It is usually held that if corporation property is debited with depreciation, it should be credited with appreciation. From a superficial consideration, this would seem to be fair, and logical, but as a matter of fact, appreciation is not the antithesis of depreciation, as generally used. There are certain items of property which increase or appreciate in value, such as road-bed, or real estate, quite independently of its life, whereas, plants depreciate through deterioration, not by reason of reduction in value. Thus it will be seen that there would be no proper use of the term "depreciation," in reference to real estate. The Courts have generally recognized appreciation in all values, based on cost of reproduction, or present value, as properly included as a part of capitalization.

"When property is valued for the purpose last stated, it is clear that the owner thereof is entitled to the benefit of any appreciation in value above the original cost and the cost of improvements, which is due to what may be termed natural causes. If improvements made in the vicinity of the property, the growth of city or town where it is located, the building of railroads, the development of the surrounding country and other like causes, give property an increased value, the owner cannot be deprived of such income by legislative action which prevents him from realizing an income commensurate with the enhanced value of his property."[2]

Public Service Commissions in some instances have considered that appreciation or increase in value should be credited to income,[3] or carried as a surplus; eventually such appreciation carried as surplus would go to stockholders as dividends or proceeds, in case the property were sold, but under the latter condition the purchasers would be obliged to capitalize the appreciа-

[1] Report of St. Louis Public Service Commission to the Municipal Assembly of St. Louis on Rates for Electric Light and Power, 1911.

[2] Cotting *vs.* Kansas City Stock Yards. 82 Fed., 839.

[3] Case No. 1260. E. G. Baltz *vs.* Brooklyn Borough Gas Company. Case No. 1273. J. G. Mayhew *vs.* Kings County Lighting Company. Public Service Commission, First District, New York.

tion so that there would seem to be no objection to doing this at any time the amount of appreciation was determined.

Fifty Per Cent. Method.—An approximate but quick, convenient and inexpensive method of estimating theoretical depreciation of certain classes of physical property has been used in some utility appraisals and may be called "The Fifty Per Cent. Method." While the method or slight modifications of it may be fair under certain conditions, it is not generally applicable and must be used with discretion. The system was originally suggested from a consideration of the mortality or life tables used by the Insurance Companies, which are based on average results. The theory of figuring depreciation based on "mortality tables of structures," is clearly set forth in the quotation from the report of the Railroad Commission of Washington in the following pages. As a general rule, it may be accepted that it is never desirable to determine depreciation without a more or less complete inspection of the physical condition of the property under consideration, but the Fifty Per Cent. Method by reason of its simplicity and prompt derivation of results, its freedom from any reliance on individual judgment or bias when supported by some necessary inspection has strong claims to pronounced advantages for certain work and in any case may be a desirable check to other methods. It has been used by Professor M. E. Cooley in connection with his figuring depreciation, in the Michigan State appraisal, B. J. Arnold, for estimating theoretical depreciation in connection with appraisal work he did for the Public Service Commission, First District, State of New York, the writer in a similar way in the preparation of statements submitted at hearings before the Public Service Commission in connection with the reorganization of the Third Avenue Railway in New York City, and the general principles, somewhat modified, by H. P. Gillette in the appraisal work he conducted for the State of Washington. It has also, as a method, been approved by the Master Car Builders' Association, in connection with the appraisal of rolling stock.

To apply the Fifty Per Cent. Method of estimating theoretical depreciation, it will be recognized that a fundamental principal for its use is that the property being depreciated shall include a large number of similar parts, all of which are subject to practically the same rate of deterioration. For example, in its application to a transmission line, the poles all should be of the same

material, wood or iron, with cross arms of similar character and of approximately uniform dimensions and the installation must have been made for a sufficiently long period to insure that the annual expense for maintenance and repair is practically uniform. This condition is only reached after property has been in use a considerable length of time, certainly 5 and preferably 10 or 15 years in the instance cited, so that the parts are being renewed piece-meal and it is possible to find some poles, cross arms and braces just ready to be replaced, others new, having been replaced within a few days or weeks, and between these extremes, all stages or conditions. Other classes of property to which this method of depreciation might be applied are rails, ties, the similar sizes of transformers, meters, arc lamps, boiler tubes, street railway motors, etc. It has been argued that the rule could not be properly applied to small transformers, meters and arc lamps, because these are replaced largely through obsolescence, but the cost of replacement when eventually renewed, does not effect the value at the time of the appraisal, because, if the apparatus under consideration is obsolete, the value thereof must be taken as scrap value, and if the apparatus is not obsolete, its value might be an average condition determinable by the application of the Fifty Per Cent. Method. In the application of this rule to boiler tubes, for example, it would probably be necessary to ascertain by inspection whether all the tubes could be taken collectively, as in an average condition, an inspection of boilers might prove that only those tubes in the lower first or second rows were being replaced and that the upper tubes would last indefinitely, so that the Fifty Per Cent. rule could only fairly be applied to the lower tubes being replaced. In the same way it may be found that mains and services of a Gas Company, in certain localities, depreciate fairly rapidly, due for example to electrolysis and therefore to depreciate the whole property, 50 per cent. would be absurd. The essential consideration in the use of the Fifty Per Cent. Method is that all parts of the property have been at least once renewed, contain a large number of similar parts and the annual maintenance account has reached a fairly uniform amount. It will be seen that the method is at once fallacious if applied to the buildings of a corporation which owns a few buildings, because all parts would not have been renewed, no repair account would reach its normal maximum which had not included the renewal of each building at

least once, and each separate building would probably be quite distinctive and unlike every other building so that none of the conditions under which the rule is applicable obtain. In the same way the rule ordinarily could not be applied even to engines or generators, because usually they are too few in number—except for the very largest organizations—to permit their being replaced without abnormally affecting the amount annually appropriated on account of depreciation.

The net result of the application of the Fifty Per Cent. Method is at once apparent; 50 per cent. of the cost, less salvage, will be immediately written off as depreciation.

The use of the Fifty Per Cent. Method demonstrates very clearly that it applies to theoretical depreciation only. It has been suggested that when the Receiver of the Third Avenue Railroad Company of New York refused to provide a fund for depreciation on the basis that all deterioration in such a large property was properly being charged as the maintenance, he therefore applied the Fifty Per Cent. Method to his entire system and "in effect inventories his property then and there at 50 per cent. of its replacement value." Such method of appraisal, in determining the present value, would, by a most cursory examination of the property, demonstrate as well as anything can, that "theoretical depreciation" is purely theoretical.

In the appraisal made by Mr. H. P. Gillette for the Railroad Commission of the State of Washington, a modification of the Fifty Per Cent. Method was used in determining depreciation, through the application of what he termed "mortality tables of structures." The method used is fully explained in the Commission's Report as follows:

"In estimating the present or depreciated value of structures, rolling stock, etc., both Michigan and Wisconsin had sent experts into the field to estimate the percentage of present value of each unit. In this manner 40,000 freight cars were inspected in Michigan, and their 'present value' estimated. To me this seemed to be not only a useless procedure, but very erroneous. Aside from the great expense of thus inspecting each car and structure, I was influenced by a belief in the far greater accuracy of applying what might be termed 'mortality tables of structures.' If the age of a man is known, his expectations of life can be estimated from mortality tables. Insurance companies do not have their doctors guess at the man's probable life. The doctor merely reports the man as not suffering from disease, and the insurance com-

pany having the man's age, applies its mortality tables. In like manner, it seemed to me, the 'present value' of a car or locomotive could be accurately estimated if its present age were known. It is a well-established fact that a freight car has a useful life exceeding 20 or 25 years. If the average car has a life of 25 years, it loses 4 per cent. of its life every year. Hence by multiplying its age in years by 4 per cent., its lost life or depreciation is accurately ascertained; and, by subtracting this depreciation from 100, the remainder will give its 'present value' expressed as a percentage of its value new.

"I believed that it would be far less expensive to ascertain the age of each car and each structure from the records of the companies, and to estimate the present value by the methods just explained than to inspect each structure in the field. This proved to be the case, and it effected a very substantial saving in the cost of the appraisal, while, at the same time, it yielded more reliable results.

"In some cases the records in the engineering office of the railways did not show the ages of existing structures, but in such cases their accounting records showed the dates when structures were built, or when cars were purchased.

"If practically all the structures shown in the accounting records are still in existence, and the money expended each year for each class of structure is known, it is a very simple matter to figure the average age of the money invested in such structures which, after all, is what is needed in estimating present value. To illustrate, suppose there are a number of station buildings in existence, whose age is not known. Suppose, however, that $10,500 was spent for such buildings in 1896, $20,000 in 1900, and $5000 in 1902. Then in 1906, the average age of the money invested in these buildings is ascertained thus:

$10,500	× 10 yrs.	equals	$105,000 one year.
$20,000	× 6 yrs.	equals	120,000 one year.
$5,000	× 4 yrs.	equals	20,000 one year.

"This gives a total of $35,500 invested seven years; for $245,000 divided by 35,500 gives seven years approximately.

"This rule to be followed in all such cases is to multiply the money expended each year for structures of a given class by the age in years, add all these products together, and divide by the total cost of all the structures under consideration. The quotient is the average age of all the structures, or, more strictly speaking, the average age of the money invested in the structures. If some of the structures are no longer in existence, this method can still be applied. Take railway cross-ties for example. Ascertain the total value of cross-ties in the track, then go back through the records of the tie renewals, by years, until the total cost of the renewals adds up to the total value of ties now in the track.

Then compute the average age as above shown. If the price of ties has fluctuated, ascertain the actual price paid, and reduce all yearly expenditures for renewals to the present price."[1]

DEPRECIATION OF NON-PHYSICAL VALUES

The percentages added to structural costs to cover engineering, incidentals, contingencies, etc., in order to obtain the total value of the physical property have usually been considered an inherent part of the cost of the physical property and treated as such in connection with its depreciation. As applied to certain parts of the property, this method of figuring depreciation is undoubtedly a correct procedure and for the sake of simplicity and consistency may be recommended, but as a matter of fact, the investment necessarily made for the original engineering in connection with certain parts of the physical equipment, for example, roadbed and track, still remains there and is as much a part of the property as the real estate, although the rails and ties, which have been cited, may have been many times relain and paid for out of and as a part of operating expenses. It would seem less unreasonable to leave such engineering investments undepreciated than it is to leave undepreciated expenditures, which when made have nothing physical to show for the investment. For example, in building the street railways, with trolleys running in conduits beneath the surface of the streets in New York City, it was first necessary to remove pipe lines, sewers, and in at least one instance a bank vault, in order to make room in the streets for the conduits. Such work involved tearing up pavements beyond lines necessary for the track itself, often from curb to curb. The money once expended for such work was lost to the investor, as far as having any property to show therefor, for of course the pavements, sewers and pipes belong to the city or other corporations and being left outside the right of way did not make apparent the expense involved in their removal. Yet in valuing the properties of the railway companies in New York, the Public Service Commission, First District, recognized the class of investment referred as a very proper and necessary one and allowed full value therefor both in estimated costs new and depreciated values of the property, as shown in Exhibit No. 57, Chapter IX.

[1] Second and Third Annual Reports of the Railroad Commission of Washington, pages 132 and 133.

Similarly, it will be seen there exists no necessary reason why "Development Expenses" and "Going Value" of a property must be depreciated because the physical property may show deterioration. In fact "Development Expenses" are not ordinarily depreciated in the same way as the physical property, though some authorities have indicated such procedure as proper.

It has been held by some that the discount on securities should be written off at the same rate as depreciation of the physical property; but there is of course no rational connection between the two and the more usual plan is to amortize such necessary discounts at a different rate, determined by the life of the bonds, for example, 50 years, whereas the depreciation of the physical property would have to be based on its rate of deterioration through life, which the Wisconsin Commission reports to average for electric lighting properties, 17.46 years, telephone plants 11.24 years, and electric railways, 18.02 years.

The Wisconsin Commission makes a practice of depreciating the usual 10 per cent. or 12 per cent. added to cover engineering incidentals and interest at the same rate as the physical property is depreciated. If the present or depreciated value of a property is estimated to be three-quarters of the cost of reproduction new, taking the base figures before percentages are allowed, then only 9 per cent. of the cost new, or, in the illustration given, 12 per cent. of the depreciated value (assuming 12 per cent. has been used in estimating the cost new) would be added to the depreciated figures to obtain the total value of the depreciated property.

SUMMARY

The principal features to be considered in estimating depreciation may be summarized as follows:

(1) The rate of depreciation adopted in estimating and providing for annually accruing depreciation must not be confused with the total sum of depreciation in physical property, which latter is an estimate for a given time.

(2) The difference between absolute and theoretical depreciation should be recognized and the amounts of each separately estimated. If both are to be considered their sum, not one or the other, is to be taken.

(3) Theoretical depreciation should be assumed and provided for as a part of operating expense if capital is to remain unim-

paired and rates are to give the maximum service at the minimum expense.

(4) Service value, determined from a consideration of the "absolute" not the "theoretical" depreciation of physical property, is to be used, in connection with certain proper non-physical values such as development expense, going value, franchises, if any, etc., in determining the basis of value of an operating property in good condition.

(5) While usually preferable, there exists no necessary reason for always writing off certain costs such as engineering, incidentals, etc., at the rate at which the physical property, of which they were originally an inherent part, is depreciated.

(6) Development expenses bear no fixed relation to the cost of the physical property and their amortization has no necessary relation to the rate of depreciation of the physical property.

(7) The amount of depreciation of physical property can only be accurately determined by more or less detailed inspection on the part of competent and conscientious engineers.

CHAPTER IX

APPRAISALS OF PUBLIC UTILITY PROPERTIES IN GREATER NEW YORK

Consideration of the valuations which have recently been made of utility properties in New York City is particularly interesting and instructive for the following reasons:

(*a*) The appraisals include some of the largest electric street railway systems in existence and also cover valuations of some important gas and electric properties.

(*b*) The appraisals are the basis of decisions of the Public Service Commission which are far reaching in result and of great financial importance.

(*c*) The appraisals were made by several different experts as well as the engineers of the Commission so that a direct comparison of methods and results is obtainable.

(*d*) The appraisals were wrought out with the greatest detail and care with respect to the working up of unit prices and percentage allowances for engineering, omissions and incidentals as well as "Development Expenses."

(*e*) The appraisals developed the most recent methods in valuation work and those features which are common to all the appraisals may be taken as the standard of the best practice at the present time.

The foregoing is sufficient explanation for the introduction in this volume of many exhibits in toto and parts of others taken from the testimony in the cases to which reference is made.

Third Avenue Railroad Company.—The property of the old Third Avenue Company, with its nine subsidiary corporations, comprising 272 miles of street, single track together with real estate, buildings, power-plant, distributing system and rolling-stock was in the hands of a Receiver when the Bond-holders Committee on Reorganization applied to the Public Service Commission of New York, First District, for approval of a proposed plan of reorganization and capitalization of the property. The Commission having indicated that any proposed plan of capital-

ization to be approved by it must bear a proper relation to the real value of the property, the author was retained in behalf of the Bond-holders to prepare and submit figures under oath, at hearings before the Commission, as to the value of the Railroad Company's property, both tangible or physical and intangible or non-physical. On the following pages, Exhibits No. 35 and No. 36, are given rather fully the valuations prepared and submitted to show the value of all the properties, including the subsidiary companies, on the basis of Cost to Reproduce New. The values in Exhibit No. 35 include 10 per cent. payment to a general contractor, to cover his charges for services in overseeing and carrying out the general contract, payment for his knowledge and experience, his own office expenses and the like, which has been added in the case of

Buildings and Structures,
Track, including Special Work,
Pavements,
Distribution Systems,
Overhead Construction,
Duct Lines,
Power Equipment,
Removal of Obstructions,
Pavement over Obstructions.

In the actual electrification of the larger part of the Third Avenue Company's tracks, costing several million dollars, the general contractor was paid 10 per cent. on the cost of all material and 15 per cent. on the payments for all labor that entered into the work.

Exhibit No. 36 gives the sum of the values set forth in Exhibit No. 35 with 15 per cent. added for engineering, incidentals, omissions, etc., to certain items, namely:

Buildings and Structures,
Track, including Special Work,
Pavements,
Distribution Systems,
Overhead Construction,
Duct Lines,
Power Equipment,
Rolling Stock,
Removal of Obstructions,
Pavement over Obstructions.

The 15 per cent. allowance on the items indicated was considered sufficient to cover the total expense of this class in connection with all items. To illustrate, an allowance of 15 per cent. on the cost of rolling stock purchased from the manufacturer may seem high, but no percentage has been added to Real Estate or Tools and Supplies, to obtain which would involve some expense other than actual cost, so that the 15 per cent. allowed on the items specified does not seem unreasonable.

On the succeeding pages, Exhibits No. 39 and No. 40 are the estimated amounts of depreciation, both "Absolute" or accrued and "Theoretical" or estimated as accruing.

Exhibit No. 50 is the appraisal of the same companies' properties prepared and submitted by the appraisal department, Mr. E. G. Connette, in charge, of the Public Service Commission. It will be noted that the figures are made up on the basis of subcontractor's charge, *i.e.*, to these figures are still to be added certain percentages. First, 10 per cent. to cover general contractor's charge, allowed and added to the same items as referred to in connection with the author's Exhibit No. 35, except "Obstructions"; second, 10 per cent. to cover "engineering, incidentals, including contingencies, incomplete inventories and loss and wastage of material during construction, and administration expenses" (Mr. Connette testified[1] that it was practically unnecessary to allow anything for omissions or errors, the inventory had been so carefully checked, although in all other appraisals submitted by him 15 per cent., not 10 per cent., has been allowed for engineering, incidentals and administration expenses, etc.), was added to

Buildings and Structures,	Overhead Construction,
Track, including Special Work,	Duct Lines,
Pavements,	Power Equipment.
Distribution Systems,	

To Rolling stock only 5 per cent. was added.

Exhibit No. 57 indicates the method of obtaining depreciation followed by the Commission. It will be noted both absolute and theoretical depreciation is considered as having accrued.

Exhibit No. 58 compares the estimates of both absolute and theoretical depreciation prepared by the author with estimates of the Commission engineers. The principal difference between the final results is due to a difference of 50 years taken in the estimated life of Buildings and Structures. It should be noted that no depreciation or writing off of investment or capitalization is proposed by the Commission as regards the items "Removal of Obstructions" and "Pavement over Obstructions" although the Company lost, absolutely, all "right, title and interest" in the outlay for such constructions from

[1] Printed testimony, p. 919, Case 1181. Plan of Reorganization, Third Avenue Railroad Co. Public Service Commission, of New York, First District.

the moment they were completed. This is a very sane and conservative position taken by the Commission but hardly one that will be commended by those seeking to allow capitalization of, or rate of return on, only physical property owned and used by corporations in the actual service of the public.

In its final decision of this case, the Commission accepted $31,600,000 as the depreciated or present value of the entire physical property of the Third Avenue Railroad and its subsidiary companies. This total figure was obtained by using their engineer's valuation as given in Exhibit No. 57, slightly increased by certain allowances to cover additions to the property made after the date of the engineer's appraisal, September 1, 1909, in order to bring the appraisal up to March 1, 1910.

To the value of the physical property, the Commission, ignoring the testimony of the experts for the Company, to refute which no evidence was introduced in the hearings, added about 12 per cent. of their value of the physical property, that is $3,500,000 to cover "Development Expenses" making a total of $35,-100,000 as the aggregate value of the property. Basing their opinion on such value they refused the Bond-holders application for approval of a plan contemplating the issuance of stock and bonds to the amount of $54,916,000 in addition to certain underlying securities aggregating in round numbers $12,000,000. The Bond-holders, refusing to accept the decision of the Commission, carried the case to the Courts and upon appeal the New York Court of Appeals sustained the contention of the Bond-holders and instructed the Commission to approve the plan of reorganization and the capitalization proposed, on the grounds that the reorganization of a Railroad Company in New York State was legal and proper along lines proposed by the Third Avenue Bond-holders and that the Commission had no authority in such reorganization cases to limit the capitalization to an amount which bore, in their opinion, proper relation to what seemed to them the fair value of the property.

Exhibit No. 69 was introduced during the testimony of the author, acting in another case for the Third Avenue Railroad Company's Reorganization Committee, in connection with hearings before the Public Service Commission as to their order for the issuance of transfer tickets between the Third Avenue, including its subsidiary companies, and other intersecting or connecting surface lines on the Island of Manhattan (New York). It was necessary

for the Company to introduce evidence as to the value of its property on Manhattan in order to justify its claim of confiscation of property, if compelled to issue the transfers called for in the order of the Commission.

It will be noticed the values of the properties are kept distinct and the Development Expenses are quite in detail. The Exhibit gives the values relating to all the physical property of the Companies, some of which, however, was not "used or useful" for conducting the traffic under consideration. Consequently Exhibit No. 74 was introduced to show the value of the property not at the time used for railroad operation. It may be noted that even the buildings were divided and the value of the parts not used deducted from the total value of the property given in Exhibit No. 69 in order that only the value of the property actually in use should be considered. Exhibits No. 73 and No. 133 are given as typical detail sheets showing how the various unit prices are applied in deriving the totals shown in Exhibits No. 35, No. 36, No. 69 and No. 74.

EXHIBIT NO. 35, JANUARY 18, 1910

PUBLIC SERVICE COMMISSION,
FIRST DISTRICT

APPLICATION OF THIRD AVENUE BONDHOLDERS' COMMITTEE

CASE NO. 1181

SUMMARY OF INVENTORIES

FORMING BASIS OF APPRAISAL BY HENRY FLOY, CONSULTING ENGINEER OF PHYSICAL PROPERTIES OF THIRD AVENUE PROPER, 42ND STREET, DRY DOCK, UNION, SOUTHERN BOULEVARD, BRONX TRACTION, KINGSBRIDGE, YONKERS and WESTCHESTER RAILROAD COMPANIES

I

GENERAL DESCRIPTION

The properties included in the appraisal lie mainly in the Boroughs of Manhattan and Bronx, with a proportion in the

Cities of Yonkers, Mt. Vernon, New Rochelle and Pelham. The railroad lines start at the Post Office, lower Broadway and Park Row, and extend north for a distance of over 20 miles in an air line, and serve territory varying in width from a mile to 8 miles, and aggregating nearly one hundred (100) square miles of the most thickly populated territory in America. The tracks and underground system of trolley constitute the most improved and at the same time the most expensive system of electric track construction for city conditions, approximating 64 miles in length of single track. There are about 190 miles of single-track, overhead, trolley construction of modern type, and in addition, about 18 miles of horse-car track. Much of the rolling stock is new and of the most approved type. The principal power station, located at 216th Street and the Harlem River, is of recent construction and equipped with modern standard apparatus, having an out-put capacity of 35,000 horse-power. There are seven substations, entirely up-to-date, and sufficient for present requirements; they are all supplied with electrical energy through high-tension cables aggregating about 140 miles in length, laid in tile, concreted, underground ducts. In Manhattan the same duct construction containing nearly 200 miles of cables is used for the distribution of all current to the underground trolleys. The ducts vary in cross-section from four to fifty holes, and aggregate about 70 miles, or over 5,000,000 duct feet.

The real estate, scattered throughout the territory served, is conveniently located and aggregates a relatively large percentage of the total values of the properties. The buildings are well suited for the purposes for which they are being used, and for the main part have been recently put in complete repair under the receiver-ship of Mr. F. W. Whitridge.

II

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF THIRD AVENUE, 42ND STREET, DRY DOCK, KINGSBRIDGE, UNION, BRONX TRACTION, SOUTHERN BOULEVARD, YONKERS AND WESTCHESTER COMPANIES' BUILDINGS

	Ownership	Area of real estate in square feet	Contents of buildings in cubic feet
Grand, Corlears & Monroe Sts., Part A. A two-story and basement brick and wood car barn. Cost per cubic foot 13 cents.	Dry Dock	13,788	244,000
Grand, Corlears & Monroe Sts., Part B. Real estate for Part B included in Part A. Two-story brick and wood stable 25 feet wide, running from Grand to Monroe Streets, cost per cubic foot 23.5 cents.	Dry Dock	.....	170,625
Monroe, Corlears & Cherry Sts. A two-story brick and wood car barn and stable. Cost per cubic foot 7.6 cents.	Dry Dock	27,875	987,000
Corlears, Cherry & Grand, Part A. A three-story brick car barn and stable, with cast iron columns, steel girders and wooden floors and joists, with a two-story brick and wood "L," cost per cubic foot 11.4 cents.	Dry Dock	24,220	813,300
Corlears, Cherry & Grand, Part B. Real estate for Part B included in Part A. A three-story brick and wood office building, cost per cubic foot 23.2 cents.	Dry Dock	.....	150,000

	Ownership	Area of real estate in square feet	Contents of buildings in cubic feet
Corlears, Cherry & Grand, Part C. Real estate for Part C included in Part A. A three-story brick and wood stable, cost per cubic foot 16.8 cents.	Dry Dock	.....	208,000
14th–15th Sts., & Ave. B., Part A. A four-story brick and wood car barn, cost per cubic foot 9.7 cents.	Dry Dock	57,084	1,168,576
14th–15th Sts., Ave. B., Part B. Real estate in Part B included in Part A. A two-story brick and steel fireproof car barn. Building was partially destroyed by fire before the date of this appraisal, and the estimate includes that part of the building now intact; cost per cubic foot 17 cents.	Dry Dock	.....	811,688
14th–15th Sts., Ave. B., Part C. Real estate in Part C included in Part A. A part two- and part three-story brick and wood stable, cost per cubic foot 9.4 cents.	Dry Dock	.....	544,757
Bayard, Elizabeth & Bowery. A one-story basement, sub-basement, stone, brick and steel fireproof building. This building was designed as a nine-story basement and sub-basement fireproof structure and only one-story basement and sub-basement, built, and was immediately used as a Cable Power Station, with large wheel vaults on Bowery side of building. Part of the building is at present used for Emergency Crew Quarters, part by Rotary Sub-station, and the balance for commercial purposes. Boilers have been removed, as also the cable machinery, cost per cubic foot 31.4 cents.	3rd Avenue	20,000	1,522,817

	Ownership	Area of real estate in square feet	Contents of buildings in cubic feet
2nd–3rd Ave., 65th Sts., Part A. A part two- and part three-story and basement brick and steel car barn, and offices. A portion of the Third Avenue front was formerly the main office of the Third Avenue Railroad. The vaults in Third Avenue adjacent to this part formerly used as a Cable wheel vault. The masonry of the tension pits of the old Cable Road are also included in the cost to reproduce; cost per cubic foot 13.9 cents.	3rd Avenue	122,508	4,425,106
2nd–3rd Ave., 65th Sts., Part B. Real estate in Part B included in Part A. A one-story and basement brick and steel fireproof engine-room, with a three-story brick and steel fireproof extension. This building was designed and built as a Cable Power Plant (engine-room only), for the Third Avenue Road, about 1890. The cable machinery has been removed and the main floor and messanine used for a truck repair shop. The space under this floor used for general storage. The three-story extension is used for car body repairs. The masonry foundation for engine included in the cost to reproduce; cost per cubic foot, 11.6 cents.	3rd Avenue	.....	4,035,678
2nd–3rd Ave., 65th–66th Sts., Part C. Real estate in Part C included in Part A. A three-story brick and steel boiler-house. This part was designed as a boiler-room and accessories of the Third Avenue Cable and Power Plant. Many of the old boilers have been removed; building now used as a Rotary Sub-station, sand dryer, storage and steam-heating plant; cost per cubic foot, 16.4 cents.	3rd Avenue	.....	1,530,150

	Ownership	Area of real estate in square feet	Contents of buildings in cubic feet
129th–130th, 3rd–Lex. Ave., Part A. A four-story and basement brick and steel fireproof office building. Originally built in 1880 as a hotel, was, previous to the date of this appraisal, gutted by fire; the walls were repaired and strengthened and used as a part of the new fireproof building. Rebuilt in 1908, except the walls and foundations, as noted above. At present used for general offices for the Third Avenue Railroad Company; cost per cubic foot, 25.8 cents.	3rd Avenue	75,687	431,900
129th–130th, 3rd–Lex. Ave., Part B. Real estate in Part B included in Part A. A four-story brick and steel fireproof car barn. Originally built in 1880 as a theater, was, previous to the date of this appraisal, gutted by fire; the walls were repaired and strengthened and used as a part of the new fireproof building. Rebuilt in 1908, except walls and foundations, as noted above. The façade similar to Part A. Cost per cubic foot, 12 cents.	3rd Avenue	.....	449,715
129th–130th, 3rd–Lex. Ave., Part C. Real estate in Part C included in Part A. A three-story brick and steel car barn. This building was originally of wood construction. In 1890 the interior was removed and made fireproof construction; cost per cubic foot, 11.2 cents.	3rd Avenue	.....	3,116,390

	Ownership	Area of real estate in square feet	Contents of buildings in cubic feet
W. 128th St., 129th St., & Amst. Ave. A three-story and basement brick and steel fireproof car barn and substation. This building originally was erected in 1886. Modified, extended and largely rebuilt in 1905. At one time used as a Cable Power station, with cable wheel vaults in Amsterdam Avenue; cost per cubic foot, 13.8 cents.	3rd Avenue	39,967	3,275,640
129th St.–130th Sts., E. of Amst. Ave. A one-story steel frame and corrugated iron car barn. This building was originally erected for a temporary boiler house for cable power while the building on the opposite side of 129th Street was in process of construction; later converted into a car barn and repair shop, cost per cubic foot 8.5 cents.	3rd Avenue	29,816	937,500
12th Ave. & Manhattan St. Part A. A one-story frame shack, used as a starter's office, cost per cubic foot 21 cents.	42nd Street	74	250
12th Ave. & Manhattan St. Part B. Real estate for Part B included in Part A. A one-story frame shack, used as a restaurant, cost per cubic foot 5.8 cents.	42nd Street	.....	3,750
Amst. Ave. & 186th St..... A one-story frame stable with two small shacks adjoining. Stable is leased for commercial purposes, cost per cubic foot 6.2 cents.	3rd Avenue	16,350	97,000
9th–10th Ave., 216th–218th Sts. A two-story brick car barn with steel roof trusses, corrugated iron roof, and fireproof floor. Entire building is used for storage of cars, cost per cubic foot 6.1 cents.	3rd Avenue	125,948	5,409,300

	Ownership	Area of real estate in square feet	Contents of buildings in cubic feet
216th–218th Sts., 9th Ave.–River A one-story brick, stone and steel fireproof power-house. This is the main power-house of the Third Avenue Railroad Company. It is to be noted that the foundations are installed for a building one-third larger than erected, cost per cubic foot 17 cents.	3rd Avenue	135,000	6,557,000
215th St. & Harlem River.... No building on this tract.	3rd Avenue	7,500	.....
42nd St., bet. Park & Lex. Aves. A four-story brick loft building, with cast iron columns, steel girders and wood floors and joists. At one time used as general offices of the 42nd, Manhattanville and St. Nicholas Avenue Railroad Company. Entire building now leased for commercial purposes, cost per cubic foot 11.8 cents.	42nd Street	4,938	268,000
129th–130th Sts. & Manhattan St., Part A. A four-story brick and steel fireproof car barn. This building was originally of brick and wood. The entire contents being gutted was replaced by modern, strictly fireproof construction. The old walls and foundations being strengthened and repaired. It is not yet completed and no cars have yet been stored therein, cost per cubic foot 11.3 cents, as of to-day.	42nd Street	28,846	1,217,300
129th–130th Sts., & Manhattan St., Part B. Real estate for Part B included in Part A. A three-story brick and wood stable, leased for commercial purposes. Erected in 1885, cost per cubic foot 11.1 cents.	42nd Street	.....	595,000

	Ownership	Area of real estate in square feet	Contents of buildings in cubic feet
So. Boulevard & 3rd Avenue.. A one-story brick and wood stable. A large yard adjoins this building which is used for the storage of wagons, and old material, cost per cubic foot 19.5 cents	Union	10,768	56,130
137th–138th St. E. of Willow Ave. A one-story brick and steel car barn, with steel roof trusses, and tar and gravel roof, cost per cubic foot 6.5 cents.	Union	31,320	813,400
E. 172nd St. & West Farms Road. A two-story brick and steel fireproof power-house. This building was originally the main power-house of the Union Railway Company. Erected in 1892, cost per cubic foot 9.5 cents.	Union	60,544	700,000
Boston Rd., 175th St. & So. Boul'd. Part A. A one-story brick car barn, with cast iron columns supporting steel roof trusses. Used in part as a general repair shop and in part for the storage of cars, cost per cubic foot 5.6 cents.	Union	49,062	911,350
Boston Rd., 175th St., & So. Boul'd. Part B. Real estate for Part B included in Part A. A one-story brick sub-station with steel roof trusses, cost per cubic foot 15 cents.	Union	.....	184,000
Boston Rd., 175th St. & So. Boul'd. Part C. Real estate for Part C included in Part A. A one-story brick and wood office building, cost per cubic foot 20.3 cents.	Union	.....	18,360

	Ownership	Area of real estate in square feet	Contents of buildings in cubic feet
E. 175th St. & Boston Road.. A part two- and part one-story and cellar brick and steel car barn and offices. This is the main car barn of the Union Railway Company. The entire second story of the façade on Boston Road is used for office purposes. The cellar in the one-story portion is used as the machine and repair shop, cost per cubic foot 10.2 cents.	Union	46,640	1,231,445
E. 190th St. & Harlem River. A one-story brick and steel fireproof building built entirely on piles. This building is used as a cable anchorage and is directly on the opposite bank of the Harlem River, from the main power-house of the Third Avenue Railroad Company, cost per cubic foot 47.5 cents.	Union	4,124	8,904
E. S. 3rd Ave., bet. 128th–129th Sts. A one-story steel frame corrugated iron building, with interior finish of wood used as a waiting room for the Union Railway Company. Situate on City Street, cost per cubic foot 25.6 cents.	Union	None	4,462
E. S. Brook Ave. near 165th Street. A one-story and cellar brick, stone and steel fireproof sub-station. This building has just been completed. It is built to replace the sub-station at 175th Street and Southern Boulevard, cost per cubic foot 13.3 cents	Union	7,300	264,500
3rd Ave. & E. 138th St..... A one-story wooden frame and metal sheet and wood finish interior waiting room, situate on City Street, cost per cubic foot 26.3 cents.	Union	None	4,612
155th St. & 8th Ave..... A one-story wooden frame metal, sheet and wood finish interior waiting room, situate on City Street, cost per cubic foot 26.3 cents.	Union	None	4,612

	Ownership	Area of real estate in square feet	Contents of buildings in cubic feet
E. S. 3rd Ave. bet. 128th–129th Sts. A one-story wood frame building sheathed inside and panelled with tin shingles. Used as a waiting room, situate on City Street, cost per cubic foot 31 cents.	Union	None	640
Wolf's Lane & Old Boston Rd. No building.	Union	234,000	.....
Main St. & Buena Vista Ave. A three-story brick and steel fireproof car barn, and sub-station, used in part as offices, repair shops, car storage and sub-station purposes. This is the main building of the Yonkers Railroad Company, cost per cubic foot 19.5 cents.	Yonkers	26,865	1,500,000
Webster Ave. (Bronx R. Rd.). A one-story brick with wood roof trusses, and wood floor construction, used as a car storage and repair shop, cost per cubic foot 6.8 cents.	Yonkers	67,000	1,403,000
Columbus & So. Fulton Aves.. A one-story brick with steel truss and wood floor car barn, used as a car storage and repair shop, cost per cubic foot 8.3 cents.	West-chester	53,820	1,560,780
Washington Avenue, 1st to Webster Ave. No building.	West-chester	19,995	.....
6th St., So. 5th—So. 4th Ave. No building.	West-chester	28,085	.....
N. 3rd Ave. near Sindey Ave.. No real estate. A one-story brick and steel fireproof sub-station. This is the only sub-station of the West-chester Railroad Company, cost per cubic foot 22.5 cents.	West-chester	None	213,220

AVERAGE PRICE PER CUBIC FOOT.

For all buildings.....12.75 cents.

Miscellaneous vaults in Streets (exclusive of vaults adjacent to and included in buildings) at Bowery and Chatham Square, 3rd Avenue, N. of 6th Street, 3rd Avenue, between 66th and 67th Streets, 3rd Avenue at 125th Street, 3rd Avenue, 130th Street and 125th Street at Manhattan Street.

These vaults were originally used as cable wheel vaults, now used for feeder man-holes.

Total value..... $120,655.

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF TRACKS OF THIRD AVENUE, 42ND STREET, DRY DOCK AND KINGSBRIDGE RAILROADS BRIEFLY STYLED AS "MANHATTAN COMPANIES"

(Length in Feet of Single Track)

THIRD AVENUE R. R.

Conduit Construction:

Park Row, Bowery, 3rd Ave., to 130th St.....	82,962.3	feet
Siding 3rd Ave., 130th St., 129th St., 66th St.....	2,196.9	"
125th St., Manhattan St.....	21,824.0	"
Sidings, 12th Ave., 8th Ave.....	832.0	"
Amsterdam Ave., Fort George loop.....	39,104.6	"
	146,919.8	" or
	27.88	miles

(Not including Amsterdam Ave., 125th St. to Manhattan St.)

The unit price per lineal foot of straight track averaged $11.88 and varied from $9.40 for the Love Type of construction to $12.44 for Duplex construction, depending on the type of construction and the character of paving.

Horse Car Tracks:

125th St., end of line to conduit construction.....	300	feet
Siding near 3rd Ave	116.8	"
	416.8	" or
	.08	miles

Value.....$1,113.00

KINGSBRIDGE R. R.

Conduit Construction:		
St. Nicholas Ave., Broadway	35,251.0	feet
	35,251.0	" or
	6.65	miles

The unit price for this type of construction is $11.18 per lineal foot.

Horse Car Tracks:		
Siding in 218th St	652	feet
Additional	1,268	" or
	1,920	" or
	0.37	miles
Value	$5,000.00	

42ND STREET, M. & ST. N. AVE. R. R.

Conduit Construction:		
First Ave., 34th to 42nd St	4,200	feet
42nd St., end to end	20,932.8	"
Seventh Ave., 42nd to 45th St	1,425.0	"
Broadway, 45th to Manhattan St	45,885.5	"
Tenth Ave., 42nd to 72nd St	15,377.7	"
	87,821.0	" or
	16.61	miles

The unit price per lineal foot of straight track averaged $11.20 and varied from $7.45 to $13.67 for Duplex construction, depending on the type of construction and character of paving.

Horse Car Tracks:		
Siding, 125th St	208.5	feet
109th St., Pleasant Ave. to end of line	630.0	"
Pleasant Ave., 109th to 110th St	280.0	"
St. Nicholas Ave., 110th St., E. River to 125th St.	20,511.6	"
12th Ave., north from 34th St	300.0	"
86th St., Amsterdam Ave. to end of line	3,091.6	"
	25,021.7	" or
	4.73	miles

The unit price per lineal foot of straight track averaged $2.42 and varied from $1.52 to $3.11, depending on the type of construction and character of paving.

DRY DOCK, EAST BROADWAY & BATTERY R.R.

Conduit Construction:

Grand St., Vestry St., East River to Greenwich St.	20,129.1	feet
Vestry, Desbrosses, Greenwich to N. River	1,312.9	"
Monroe, Corlears Sts	587.2	"
Essex St., Ave. A, Grand to 2nd St	2,476.0	"
Clinton St., Grand to 2nd	2,306.2	"
Greenwich St., Beach to Cortlandt (Not including Greenwich, Canal to Beach.)	3,621.1	"
Washington St., N. Moore to Cortlandt (Not including Washington, Canal to N. Moore.)	3,280.6	"
Cortlandt, Greenwich to end of line	720.8	"
2nd St., Ave. A to Ave. B	736.5	"
34th St., River to First Ave (Not including 10th St. from Ave. B to Ave. D, not 11th St., from Ave. C to Ave. D, nor Goerick from Grand to E. Houston, nor E. Houston from Goerick to Ave. D, nor Fulton, B'way to Washington.)	600.0	"
Ave. B near 14th St	378.6	"
1st Ave., 34th St. to end of conduit	159.3	"
Canal St., Center St., to W. H. L., B'way	1,545.0	"
Park Row, Post Office loop to Center St	754.8	"
	38,493.2	" or
	7.31	miles

The unit price per lineal foot of single track averaged $8.70 and varied from $4.75 to $9.66, depending on the type of construction and character of paving.

Horse Car Tracks:

East B'way, Grand to James St	9,136.0	feet
Grand St	162.5	"
Canal St., E. B'way to center	6,590.6	"
Walker & N. Moore, Mulberry to Washington	3,747.1	"
Lispenard and Beach, B'way to Hudson	2,388.6	feet
Columbia St. and Ave. D., Grand St. to 14th St	6,692.9	"
Lewis St., Grand to 8th St	3,663.7	"
8th St., Lewis St. to Ave. D	293.2	"
Vestry St., Greenwich St. to end of line	732.3	"
14th St., Ave. D to Ave. B	2,807.6	"
1st Ave., 30th to 34th Sts., 14th to 23rd	4,058.8	"
Ave. A., 23rd to 24th St	555.4	"
Clinton St., E. B'way to end of line	650.0	"
Essex St., E. B'way to Grand St	1,067.6	"
Ave. B, 2nd St. to 14th St	6,197.4	"
	48,743.7	" or
	9.23	miles

The unit price per lineal foot of straight track averaged $2.30 and varied from $1.46 to $3.20, depending on the type of construction and character of paving.

In Car Barns:

Conduit and Horse Tracks, "Manhattan Companies"	43,434 feet or 8.20 miles	
Value		$111,753

Special Work:

The distances given for the straight track lengths include the lengths of special work pieces, measured to tangent intersections. The value of each special work piece, including plain curves, crossovers, etc., was determined separately and should be added to the values for straight track as determined by the unit prices.

Third Ave. Special Work, Value	$503,800
Dry Dock Special Work, Value	232,101
42nd Street Special Work, Value	278,000
Kingsbridge Special Work, Value	25,466
Rent of Store Yards, additional handling, etc., in Manhattan, Value	$116,600

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF TROLLEY TRACKS OF UNION, BRONX TRACTION, SOUTHERN BOULEVARD, YONKERS AND WESTCHESTER COMPANIES

(Length in Feet of Single Track)

UNION RAILWAY:		
3rd Ave., 128th St., Webster Ave	50,923.5	feet
Walker Ave., E. Bronx St., Boston Rd	1,261.0	"
Boston Rd., 3rd Ave., near Scis.X-over	21,413.5	"
Fordham Rd., Webster Ave., 230th St	48,626.0	"
Gun Hill Rd,, W. P. Rd., Webster Ave	2,790.6	"
Tremont Ave., Boston Rd., Sedgwick Ave	26,340.8	"
Webster Ave., 133rd St., City line	79,049.2	"
Sedgwick Ave., Jerome Ave. to Tremont	21,143.9	"
W. P. Rd., Allerton Ave., 233rd St	21,454.8	"
Jerome Ave., Macomb's Br., City line	67,642.0	"
161st St., 3rd Ave. to Jerome Ave	12,285.7	"
Boscobel, Jerome Ave. to Aqueduct	6,430.1	"
Locust Ave., 134th St., 138th St	1,042.3	"
138th St., east of Locust Ave. to Bridge approach	16,638.4	"
Lincoln Ave., 133rd St., 161st St	14,497.0	"
Westchester Ave., 3rd Ave., Div. with Bronx Traction Company	20,935.3	"
135th St., Madison to 8th Ave	6,573.3	"
155th St., Macomb's Pl., 8th Ave	1,582.2	"
Macomb's Bridge, 154th St., Jerome Ave	3,220.6	"
136th St., Lincoln to 3rd Ave	408.9	"
133rd St., Lincoln to 3rd Ave	626.1	"
Lexington Ave., Harlem Bridge	880.0	"
Pelham Ave., 3rd Ave., So. Boulevard	6,017.5	"
St. Ann's Avenue	15,019.2	"
	446,801.9	" or
	84.60	miles

The unit price per lineal foot of straight track averaged $3.00 and varied from $2.46 to $3.23.

BRONX TRACTION COMPANY:		
Westchester Ave. Div. with Union Ry. Co., Walker Ave	25,688.1	feet
W. P. Rd., Morris Park Ave., Allerton Ave	15,359.6	"
Morris Park Ave., Walker Ave., W. P. Rd	9,532.5	"
Classon Pt. Ave., end of line, West Ave	23,858.6	"
Walker Ave. Fort Schy. Rd., E. Bronx St	20,476.9	"
Fort Schy. Rd., E. Boul., end of line	5,520.5	"
Bear Swamp Road	3,885.0	"
	104,321.2	" or
	19.80	miles

The unit price per lineal foot of straight track averaged $2.72 and varied from $2.46 to $3.23.

SOUTHERN BOULEVARD R. R.:		
So. Boulevard, Lincoln Ave., Boston Rd	40,295.2	feet
So. Boulevard, Lincoln Ave., S. of Alexander Ave	1,238.4	"
So. Boulevard, S. of Alexander Ave., N. of Willis	1,558.8	"
So. Boulevard, N. of Willis, N. of 138th St	7,920.0	"
So. Boulevard, N. of 138th St., N. of 141st St	2,580.0	"
So. Boulevard, N. of 141st St., S. of St. Mary's Pl	1,041.2	"
So. Boulevard, S. of St. Mary's Pl., S. of Jennings	21,598.6	"
So. Boulevard, S. of Jennings St., S. of Boston Rd	4,041.4	"
So. Boulevard, S. of Boston Rd., S. of Boston Rd	316.8	"
	40,295.2	" or
The unit price per lineal foot of straight track averaged $2.82 and varied from $2.46 to $3.23.	7.64	miles
In Car Barns:		
Union, Bronx Traction, Southern Boulevard	8,893.9	feet or
	1.70	miles
Value $12,538		
Special Work:		
Value $363,020		
YONKERS R.R.:		
Warburton Ave., Main St., Yonkers, Main St., Hastings	30,398.0	feet
Riverdale Ave., Main St., South City line	8,640.0	"
Main St., Terminal Getty Square	3,296.0	"
Palisade Ave., Getty Sq., Roberts Ave	12,558.0	"
Elm St., Palisade Ave., Nepperhan	720.0	"
South Broadway, Getty Sq., So. City line, Yonkers	16,950.0	"
New Main St., Getty Sq., South Broadway	5,108.0	"
Nepperhan Ave., New Main St., Bronx River	25,982.0	"
Yonkers Ave., Nepperhan Ave., East City line, Yonkers	22,007.0	"
McLean Ave., So. Broadway, Bronx River Rd	30,728.0	"
Bronx River Rd., McLean Ave., Yonkers Ave	11,618.0	"
Elm & Walnut Sts., Nepperhan Ave., Lake Ave	6,947.0	"
Central Ave., Yonkers Ave., South City line	15,200.0	"
	190,152.0	" or
The unit price per lineal foot of straight track averaged $2.90 and varied from $2.46 to $3.23.	36.00	miles

In Car Barns:		
Total Feet	8,448.0	or
	1.60	miles
Value.....$19,265		
Special Work:		
Value.....$163,456		
WESTCHESTER ELECTRIC R.R.:		
New York City,		
White Plains Road, Town Dock	17,805.0	feet
Mt. Vernon City,		
W. Lincoln Ave., East line, City	67,843.0	"
Bronxville,		
Poplar St., Bronxville, North line	5,130.0	"
Village, Tuckahoe,		
N. Bronx line, Bronx River	5,380.0	"
Town of Eastchester,		
Midland Ave., East Town line	17,790.0	"
Village, North Pelham,		
4th St., W. line, North line	6,505.0	"
Village of Pelham,		
3rd St., East line	17,910.0	"
New Rochelle City,		
Within City limits	62,710.0	"
Town of Mamaroneck,		
Boston Rd., Invermere	1,300.0	"
	202,374.0	" or
	38.30	miles
The unit price per lineal foot of straight track averaged $3.28 and varied from $2.46 to $3.23.		
In Car Barns:		
Total Feet	4,960	or
	0.90	miles
Value.....$10,413		
Special Work:		
Value.....$128,878		

Grand totals	Conduit		Horse		Trolley	
	Feet	Miles	Feet	Miles	Feet	Miles
Third Avenue	146,919.8	27.83	416.8	0.08		
42nd St.	87,821.0	16.61	25,021.7	4.73		
Dry Dock	38,493.2	7.31	48,743.7	9.23		
Kingsbridge	35,251.0	6.65	1,920.0	0.37		
Car Barns in above	25,122.0	4.74	18,311.9	3.46		
Union					446,801.9	84.60
Bronx Traction					104,321.2	19.80
Southern Boulevard					40,295.2	7.64
Car Barns in above					8,893.9	1.70
Yonkers					190,152.0	36.00
Westchester					202,374.0	38.30
Car Barns in above					13,408.0	2.50
Total in feet	333,607		94,414.10		1,006,246.2	
Total in miles		63.19		17.87		190.54
Grand total	1,434,267.3 Feet or 271.6 Miles.					

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF PAVING FOR TRACKS OF THIRD AVENUE, 42ND STREET, DRY DOCK AND KINGSBRIDGE RAILROADS BRIEFLY STYLED AS "MANHATTAN COMPANIES"

	Price per sq. yd.
Granite on Concrete	$3.63
Granite on Sand Conduit Track	2.97
Granite on Sand	2.15
Asphalt on Concrete	2.75
Asphalt on Stone	1.93
Asphalt on Macadam	1.87
Wood Block on Concrete	4.07
Asphalt Block on Concrete	3.03
Belgian Block on Sand	1.49
Trap or Cobble on Sand	.39
Macadam on Telford	1.38
Macadam on Earth	.82

The above values for paving are based on cost, without maintenance charge. Where tracks are laid ten feet, one-half inch, standard centers, two feet are allowed for paving outside of track, and five feet between the up and down track.

Lengths used are those given for total measurements under "tracks," without deduction. Prices include paving base where used, unless concrete is required for track.

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF PAVING FOR TRACKS OF UNION, BRONX TRACTION AND SOUTHERN BOULEVARD RAILROADS

	Price per sq. yd.
Granite on Concrete	$3.30
Granite on Sand	2.15
Asphalt on Concrete	2.42
Asphalt on Stone	1.93
Asphalt Block on Concrete	2.70
Wood Block on Concrete	3.74
Slag Brick on Concrete	3.41
Brick on Concrete	2.75
Macadam on Telford	1.38
Macadam on Earth	.83
Trap or Cobble	.39
Earth	.28
Cinders	.44
Plank flooring	1.58

The above values for paving are based on cost, without maintenance charge. Where tracks are laid ten feet, one-half inch, standard centers, two feet are allowed for paving outside of track, and five feet between the up and down track.

Lengths used are those given for total measurements under "track" without deduction. Prices include paving base where used.

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF PAVING FOR TRACKS OF YONKERS AND WESTCHESTER RAILROADS

	Price per sq. yd.
Granite on Concrete	$3.30
Granite on Sand	2.15
Asphalt on Concrete	3.08
Asphalt on Stone	2.75
Asphalt Block on Concrete	2.70
Wood Block on Concrete	3.74
Slag Brick on Concrete	3.41
Brick on Concrete	3.25
Macadam on Telford	1.54
Macadam on Earth	.99
Trap or Cobble	.39
Earth	.28
Cinders	.44

The above values for paving are based on cost, without maintenance charge. Where tracks are laid ten feet, one-half inch, standard centers, two feet are allowed for paving outside of track, and five feet between the up and down track.

Lengths used are those given for total measurements under "track," without deduction. Prices include paving base where used.

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF HIGH AND LOW TENSION CABLES OF THIRD AVENUE, 42ND STREET, DRY DOCK, KINGSBRIDGE, UNION BRONX TRACTION, SOUTHERN BOULEVARD, YONKERS AND WESTCHESTER RAILROADS

No. 4/0 high-tension, 3-conductor, lead-covered,	
Third Avenue R. R.	410,282 ft.
Union R. R.	233,213 "
Yonkers R. R.	45,561 "
Westchester R. R.	11,764 "
Total	700,820 "
700,820 ft. @ $1.31 per lineal foot.	
No. 4/0 high-tension, 3-conductor, leaded & armored (submarine),	
Union R. R.	6,250 ft.
6,250 feet @ $2.00 per lineal foot.	
No. 500,000 c. m., low-tension, single-conductor, lead-covered,	
Third Ave. R. R.	3,234 ft.
42nd Street R. R.	57,157 "
Dry Dock R. R.	29,404 "
Kingsbridge R. R.	34,596 "
Total	124,401 "
124,401 feet @ $0.70 per lineal foot.	
No. 1,000,000 c. m., low-tension, single-conductor, lead-covered,	
Third Ave. R. R.	402,596 ft.
42nd Street R. R.	206,194 "
Dry Dock R. R.	44,401 "
Kingsbridge R. R.	86,040 "
Union R. R.	117,433 "
Total	856,664 "
856,664 feet @ $1.16 per lineal foot.	
No. 1,000,000 c. m. (Bare) ground return,	
Union R. R.	3,200. ft.
3,200 feet @ $0.72 per lineal foot.	
No. 2,000,000 c. m. (Bare) ground return,	
Union R. R.	30,076 ft.
30,076 feet @ $1.44 per lineal foot.	

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF CONDUCTOR BARS AND BONDS, EQUALIZERS, TAPS, ETC. OF THIRD AVENUE, 42ND STREET, DRY DOCK, KINGSBRIDGE, UNION, BRONX TRACTION, SOUTHERN BOULEVARD, YONKERS AND WESTCHESTER RAILROADS

CONDUCTOR BARS:	
Manhattan Companies	$350,117
BONDS:	
Bronx Companies	83,851
Yonkers & Westchester Cos.	46,200
EQUALIZERS, TAPS, ETC.:	
Manhattan Companies	22,158
Bronx Companies	1,794

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF OVERHEAD TROLLEY CONSTRUCTION OF UNION, BRONX TRACTION, SOUTHERN BOULEVARD, YONKERS AND WESTCHESTER

UNION RAILWAY COMPANY	
Cost of overhead construction, including tangent and special work	$3,230 per mile
BRONX TRACTION COMPANY	
Cost of overhead construction, including tangent and special work	2,140 " "
SOUTHERN BOULEVARD COMPANY	
Cost of overhead construction, including tangent and special work	3,910 " "
YONKERS RAILROAD	
Cost of overhead construction, including tangent and special work	2,580 " "
WESTCHESTER RAILROAD	
Cost of overhead construction, including tangent and special work	3,670 " "

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF TROLLEY WIRES OF UNION, BRONX TRACTION, SOUTHERN BOULEVARD, YONKERS & WESTCHESTER

UNION RAILWAY COMPANY	
	Price per ft.
Tangent and special work	439,471 ft. at 8-2/10¢
BRONX TRACTION COMPANY	
Tangent and special work	103,578 ft. at 8-2/10¢
SOUTHERN BOULEVARD COMPANY	
Tangent and special work	41.903 ft. at 8-2/10¢
YONKERS RAILROAD COMPANY	
Tangent and special work	208,664 ft. at 8-2/10¢
WESTCHESTER RAILROAD COMPANY	
Tangent and special work	208,027 ft. at 8-2/10¢

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF FEEDERS OF UNION, BRONX TRACTION, SOUTHERN BOULEVARD, YONKERS AND WESTCHESTER

UNION RAILWAY COMPANY

		Price per ft.
500,000 C. M. weather proof	419,922 ft. at	$ .40
4/0 weather proof	11,700 " "	.18
500,000 C. M. paper & lead armored	1,365 " "	.86
1,000,000 C. M. paper & lead armored	4,000 " "	1.36
1/0 paper & lead armored	3,675 " "	.33

BRONX TRACTION COMPANY

500,000 weather proof	52,141 " "	.40
4/0 weather proof	15,041 " "	.18
1,000,000 C. M. paper & lead armored	433 " "	1.36

SOUTHERN BOULEVARD COMPANY

500,000 C. M. weather proof	15,546 " "	.40
4/0 weather proof	33,738 " "	.18

YONKERS RAILROAD COMPANY

500,000 C. M. weather proof	171,339 " "	.40
4/0 & 1,000,000 C. M. bare ground return, value	$8,588	
500,000 C. M. bare ground return, value	$4,364	

WESTCHESTER RAILROAD COMPANY

1,000,000 C. M. paper & lead	159,200 " "	.40
4/0 weather proof	9,949 " "	.18

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF DUCTS OF THIRD AVENUE, 42ND STREET, DRY DOCK & KINGSBRIDGE RAILROADS, UNION, BRONX TRACTION, SOUTHERN BOULEVARD, YONKERS AND WESTCHESTER

"MANHATTAN COMPANIES"

Total length of trenches	266,505 ft.	
At an average price per trench foot of		$4.80
808 Manholes at		$280.00

UNION RAILWAY COMPANY

Total length of trenches	60,327 ft.	
At an average price per trench foot of		$3.60
179 Manholes at		$197.00

YONKERS AND WESTCHESTER COMPANIES

Total length of trenches	35,347 ft.	
At an average price per trench foot of		$3.15
115 Manholes at		$149.25

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF STATION APPARATUS OF THIRD AVENUE, 42ND STREET, DRY DOCK AND KINGSBRIDGE RAILROADS BRIEFLY STYLED AS "MANHATTAN COMPANIES"

	Third Ave.	Union	Yonkers & Westchester	Price
KINGSBRIDGE STATION:				
Vertical Engines, 5,000 H. P., cross-compound, direct-connected to alternating current generators	8	....	....	
Price per Unit	.....	.....	.....	$133,100
Exciter Compound Engines, 250 H.P., direct-connected to direct-current generators	4	....	....	
Price per Unit	.....	.....	.....	$7,040
Switching Apparatus, Wiring, etc., Value	1	.....	.....	$111,995
Water Tube Boilers with Automatic Stokers, 520 H. P.	30	....	....	
Price per Unit	.....	.....	.....	$10,308
Condensers, Economizers, Feed Water Heaters, Pumps, Coal and Ash Conveying Machinery, Piping, Switchboards, Station Wiring, etc., Generating Station Value	1	....	.....	$520,690
SUBSTATIONS:				
Rotary Converters, 500 K. W.	..	....	6	
Price per Unit	.....	.....	.....	$7,150
Rotary Converters, 1,000 K. W.	11	4	....	
Price per Unit	.....	.....	.....	$12,000
Rotary Converters, 1,500 K. W.	..	4	....	
Price per Unit	.....	.....	.....	$16,790
Motor Generators	5	1	....	
Value	.....	.....	.....	$20,670
Transformers, 175 K.W., 6,000, 350 volts, oil, self-cooling	..	....	18	
Price per Unit	.....	.....	.....	$1,170
Transformers, 375 K.W., 6,000, 350 volts, oil, self-cooling	35	12	....	
Price per Unit	.....	.....	.....	$1,960
Transformers, 500 K.W., 6,000, 350 volts, air blast	..	12	....	
Price per Unit	.....	.....	.....	$2,080

SUMMARY OF STATION APPARATUS (*continued*):

	Third Ave.	Union	Yonkers & Westchester	Price
Transformers, 30 K. W., 6,000,350 volts, oil, self-cooling	3	3	....	
Price per Unit				$330
Storage Battery Complete, 276 cell	3	....	....	
Price per Unit				$91,300
High and Low Tension Switchboards, Wiring and Auxiliary Apparatus, for Sub-stations	3	2	2	
65th St. and Third Ave		Value,		$36,000
129th St. and Amsterdam Ave.		"		54,367
Bayard Street		"		40,723
West Farms		"		31,290
Brook Ave		"		31,750
Yonkers		"		23,600
Westchester		"		24,380

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF ROLLING STOCK OF THIRD AVENUE, 42ND STREET, DRY DOCK AND KINGSBRIDGE RAILROADS, BRIEFLY STYLED AS "MANHATTAN COMPANIES"

PASSENGER AND SERVICE BODIES OF ELECTRICALLY EQUIPPED CARS

No.	Type	Builder		Unit price to reproduce
	Owned and Operated by MANHATTAN COMPANIES			
82	12-Bench	Brill	at	$1,245
93	S. T. C	La Cl.	"	1,475
16	D. T. C	St. L.	"	2,500
61	D. T. C	Brill	"	1,675
15	Conv	"	"	1,675
75	D. T. C	"	"	1,800
20	12-Bench	"	"	1,300
150	P. A. Y. E	"	"	2,000
276	"	"	"	2,200
	Leased to YONKERS R. R. Co.			
10	D. T. C	Brill	at	1,675
39	12-Bench	"	"	1,300
	Leased to UNION RY. CO.			
50	12-Bench	Brill	at	1,254
100	D. T. C	"	"	1,675
	Leased to WESTCHESTER ELECTRIC COMPANY			
50	12-Bench	Brill	at	1,254
	SERVICE CAR BODIES			
	Sweepers, Scrapers, Miscellaneous, Value	$22,350		

MOTORS OF ELECTRICALLY EQUIPPED CARS

No.	Type			Unit price to reproduce
	Owned and Operated by MANHATTAN COMPANIES			
210	General Electric	210	at	$650
44	" "	57	"	600
4	" "	1000	"	425
38	Westinghouse	69	"	380
226	"	68	"	410
86	"	56	"	630
2	"	49	"	400
552	"	310	"	675
36	"	56	"	630
452	General Electric	210	"	650
	Leased to YONKERS R. R. Co.			
80	Westinghouse	56	"	630
	Leased to UNION RY. CO.			
44	Westinghouse	68	"	410
256	"	56	"	630
	Leased to WESTCHESTER ELECTRIC COMPANY			
2	General Electric	57	"	600
98	Westinghouse	56	"	630

TRUCKS OF ELECTRICALLY EQUIPPED CARS

No.	Type	Builder		Unit price to reproduce
	Owned and Operated by MANHATTAN COMPANIES			
314	No. 22 E	Brill M. T.	at	200
2	M. T.	Standard	"	262
32	Double	Peckham	"	235
100	Single	"	"	250
2	"	Brill	"	205
1	"	Diamond	"	225
850	No. 39 E	Brill M. T.	"	[1]325
190	No. 22 E	" "	"	[1]250
	Leased to YONKERS R. R. Co.			
80	No. 22 E	Brill M. T.	"	200
	Leased to UNION RY. COMPANY			
300	No. 22 E	Brill M. T.	at	200
	Leased to WESTCHESTER ELECTRIC COMPANY			
100	No. 22 E	Brill M. T.	at	200
	HORSE CARS OWNED BY DRY DOCK, EAST BROADWAY & BATTERY R. R. Co.			
27	Horse Cars		at	$1,200
Plows, Sweepers, etc.	Value			$5,200

[1] Price includes Steel Wheels; other prices Cast Wheels.

SUMMARY MISCELLANEOUS CAR EQUIPMENT
"MANHATTAN COMPANIES"

Article	Unit price new	Total No.
Brakes, Sterling hand	$15.00	1034
Brakes, Peacock hand	15.00	1040
Brakes, West. Air	320.00	235
Brakes, Nat'l Air	325.00	1
Brakes, Allis Chalmers Air	280.00	200
Vestibules, Portable	25.00	693
Circuit Breakers, M. Q	18.00	521
Circuit Breakers, M. R	20.00	894
Circuit Breakers, West	20.00	695
Controllers, K-7-C or K-7	122.60	3
Controllers, K-8-B or k-d	112.60	538
Controllers, K-9	99.60	198
Controllers, K-10	90.00	1
Controllers, K-27	117.60	1341
Controllers, K-29	176.30	32
Controllers, R-17	90.00	11
Resistances, West. Short	9.00	439
Resistances, West. Long	10.00	205
Resistances, West. 3 Pt	35.00	849
Resistances, West. Drum	8.00	66
Resistances, G. E. Grid	10.00	1600
Wood Switches, T. H	8.50	4
Hood Switches, M. S	15.00	610
Hood Switches, West	10.00	407
Wheels, per pr. steel drivers, no axles	50.00	667
Wheel Guards, H. B	20.00	958
Registers, Sterling Meaker, No. 5	22.00	154
Registers, International	14.00	400
Registers, New Haven	14.00	59
Heaters—Set of 4 complete	18.50	3
Heaters—Set of 6 complete	22.00	81
Heaters—Set of 8 complete	26.50	177
Heaters—Set of 12 complete	35.50	9
Heaters—Set of 16 complete	43.50	635
Headlights	4.00	2078
Trolley Bases, complete, U. S. No. 6	18.00	10
Trolley Bases, complete, U. S. No. 11	18.00	90
Trolley Bases, complete, S. M. No. 4	15.00	[illegible]
Lightning Arresters, G. E. M. D	6.50	120
Lightning Arresters, West. M. P	2 19	360
Signs, "Millan" Type, Side	6.00	14[illegible]6
Signs, "Millan" Type, End	9 00	1438
Signs "Millan" Type, Vestibule	1.15	717
Plows	16.00	656
Controller handles per pr	1.50	[illegible]

SUMMARY MISCELLANEOUS CAR EQUIPMENT—(*Continued*):

Article	Unit price new	Total No.
Car Wiring	.....	1052
Registers, P. A. Y. E. Portable	28.00	425
Signs, "Hunter," Side	12.50	550
Signs, "Hunter," End	12.50	550
Signs, "Hunter," Vestibule	12.50	550

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF ROLLING STOCK OF UNION, BRONX TRACTION, SOUTHERN BOULEVARD, YONKERS AND WESTCHESTER COMPANIES

PASSENGER CAR BODIES OF ELECTRICALLY EQUIPPED CARS

No.	Type	Builder	Unit price to reproduce
Owned and Operated by UNION RAILWAY CO			
113	D. T. C.	....	$ 1,675
64	S. T. C.	American	1,300
9	S. T. C.	Laclede	1,500
9	S. T. C.	Stephenson	1,600
17	S. T. C.	St. Louis	1,200
10	S. T. C.	Gilbert	1,200
27	S. T. C.	American	1,200
29	D. T. O.	14–B	1,374
8	S. T. O.	American 8–B	1,000
33	S. T. O.	Steph. 10–B	1,025
107	S. T. O.	Bril	1,025
Leased to YONKERS R. R. CO.			
6	D. T. C.	....	$1,675
25	S. Conv.	....	2,350
21	D. T. O.	14–B	1,374
4	S. T. O.	Steph. 10–B	1,025
3	S. T. C.	Laclede	1,475
5	S. T. C.	American	1,500
Leased to TARRYTOWN W. P. & M. RAILWAY COMPANY			
3	S. T. O.	Steph. 10–B	$1,025
6	D. T. C.	....	1,675
7	S. T. C.	American	1,300
11	S. T. C.	Steph.	1,600
4	S. T. C.	American	1,300
.....	P. A. Y. E.	Brill	2,200
Leased to WESTCHESTER ELECTRIC COMPANY			
25	S. T. C.	American	$1,300
Owned and Operated by YONKERS CO.			
15	D. T. B.	St. Louis	$2,500
7	S. T. B.	St. Louis	1,200
Owned and Operated by WESTCHESTER ELECTRIC CO.			
20	D. T. C.	Brill	2,500

SERVICE BODIES OF ELECTRICALLY EQUIPPED CARS

Owned and Operated by UNION RAILWAY CO.

Sweepers, sand cars, etc	32	
Value		$38,756.00

Leased to YONKERS R. R. CO.

Sweepers, sand cars, etc	7	
Value		$6,725.00

Leased to TARRYTOWN W. P. & M. RAILWAY CO.

Sweepers, sand cars, etc	11	
Value		$6,100.00

Leased to WESTCHESTER ELECTRIC CO.

Sweepers, sand cars, etc	7	
Value		$5,450.00

Owned and Operated by YONKERS COMPANY

Sweepers, sprinklers, etc	4	
Value		$4,880.00

MOTORS OF ELECTRICALLY EQUIPPED CARS

No.	Type	Unit price to reproduce
	Owned and Operated by UNION RAILWAY COMPANY	
140	G. E. 57	$600
5	G. E. 52	375
30	G. E. 800	375
280	G. E. 1000	425
2	West. 69	380
303	West. 68	410
170	West. 56	630
151	West. 49	400
	Leased to WESTCHESTER ELECTRIC COMPANY	
2	G. E. 52	$375
5	G. E. 800	375
58	G. E. 1000	425
2	West. 68	410
	Leased to YONKERS R. R. CO.	
104	G. E. 57	$600
7	G. E. 800	375
18	G. E. 1000	425
10	West. 68	410
2	West. 49	400
16	G. E. 210	650
	Leased to TARRYTOWN, W. P. & M. RAILWAY COMPANY	
12	G. E. 57	$600
2	G. E. 800	375
42	G. E. 1000	425
26	West. 68	410
2	West. 49	400
6	G. E. 210	650

No.	Type	Unit price to reproduce
	MOTORS OF ELECTRICALLY EQUIPPED CARS (*continued*):	
	Owned by YONKERS COMPANY	
30	G. E. 210	$650
12	G. E. 1000	425
17	West. 68	410
	Owned by WESTCHESTER ELECTRIC COMPANY	
40	G. E. 210	$650
	TRUCKS OF ELECTRICALLY EQUIPPED CARS	
	Owned and operated by UNION RAILWAY CO.	
284	Brill No. 22 E	$200
244	Peck. Single	250
59	Diamond Single	225
	Leased to WESTCHESTER ELECTRIC COMPANY	
11	Peck. Single	$250
18	Diamond Single	225
	Leased to YONKERS R. R. COMPANY	
120	Brill No. 22 E	$200
9	Peck. Single	250
1	Brill Single	205
5	Diamond Single	225
	Leased to TARRYTOWN W. P. & M. RAILWAY COMPANY	
12	Brill No. 22 E	$200
23	Peck. Single	250
11	Brill Single	205
6	Brill No. 39 E., M. T	325[1]
	Owned by YONKERS R. R. CO.	
30	St. Louis 47 D. T	$200
7	Peckham S. T	250
	Owned by WESTCHESTER ELECTRIC COMPANY	
40	M. F. Brill	$200

SUMMARY MISCELLANEOUS CAR EQUIPMENT

Article	Unit price new	Total No.
UNION RAILWAY AND SUBSIDIARY COMPANIES		
Brakes, Sterling hand	$15.00	610
Vestibules, Portable	25.00	572
Vestibules, Second hand	8.00	25
Circuit Breakers, M. Q	18.00	370
Circuit Breakers, M. R	20.00	388
Circuit Breakers, West	20.00	407

[1] Includes steel wheels; other prices cast wheels.

UNION RAILWAY AND SUBSIDIARY COMPANIES (*continued*):

Article	Unit price new	Total No.
Gates-Wood	8.00	55
Controllers, K-7 or K-7-C	122.60	9
Controllers, K-8 or K-8-B	112.60	89
Controllers, K-9	99.60	119
Controllers, K-10	90.00	417
Controllers, K-11	98.00	493
Controllers, K-2	100.00	14
Resistances, West. Short	9.00	1076
Resistances, West. Long	10.00	3
Resistances, Lundie	8.00	92
Resistances, G. E. Grid	10.00	383
Resistances, G. E. P. R.	9.00	44
Hood Switches, T. H	8.50	35
Hood Switches, West	10.00	43
Wheels, per pr. steel drivers, no axles	50.00	18
Wheels, per pr. cast drivers, with axles	20.00	103
Wheels, per pr. cast ponies, with axles	8.00	11
Wheels, per pr. steel drivers, with axles	65.00	7
Wheel Guards, Parmenter	20.00	62
Wheel Guards, H. B	20.00	732
Registers, Sterling Meaker No. 5	22.00	444
Registers, International	14.00	39
Registers, Security	22.00	35
Heaters, Set of four complete	18.50	9
Heaters, Set of six complete	22.00	186
Heaters, Set of sixteen complete	43.50	144
Heaters, Set of eighteen complete	47.00	5
Headlights	4.00	1106
Trolley Bases, Complete, U. S. No. 6	18.27	621
Trolley Bases, Complete, U. S. No. 11	18.00	1
Lightning Arresters, G. E. M. D	6.50	298
Lightning Arresters, West. M. P	2.19	897
Signs, "Millen" type, Side	6.00	604
Signs, "Millen" type, End	9.00	1098
Signs, "Millen" type, Vestibule	1.15	380
Plows	16.00	....
Controller handles per pr	1.50	1033
Car Wiring	.....	589

YONKERS COMPANY

Miscellaneous car equipment,
Value $16,254

WESTCHESTER ELECTRIC COMPANY

Miscellaneous car equipment,
Value $9,567

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF TRACK EXCAVATION FOR CONDUIT CONSTRUCTION. THIRD AVENUE, 42ND STREET, DRY DOCK AND KINGSBRIDGE RAILROADS, BRIEFLY STYLED AS "MANHATTAN COMPANIES"

The lengths to which the unit prices herein given are applied, are the same as the lengths of single track given under "Cost of Reproduction of Track."

Line	Section	Cu. yd. per lin. ft.	Cost per lin. ft.
THIRD AVENUE R. R.....	Park Row, Bowery and 3rd Ave., Post Office to 130th St., and Lexington Ave., 129th St. and 130th St., 66th St., 3rd Ave. to end of spur, 125th St. and Manhattan St.....	1.1	$3.05
	Amsterdam Ave. to 191st St.	1.0	3.35
	Amsterdam Ave., 191st to loop.....	0.8	2.65
42ND ST., M. & ST. N. AVE. R. R.....	42nd St., E. to N. River, 7th Ave., 42nd St. to 45th St.	1.1	3.20
	B'way 45th to 59th St.....	1.0	3.35
	B'way 59th to Manhattan St.	1.15	5.40
	10th Ave., 42nd to 53rd St..	0.66	2.20
	10th Ave., 53rd to 72nd St..	1.1	3.65
	1st Ave., 34th to 42nd St...	0.84	2.45
DRY DOCK, E. B'WAY & BATTERY R. R. Co.....	Throughout.....	0.85	2.45
KINGSBRIDGE RAILWAY COMPANY.....	162nd St. to end of line	1.1	4.25
UNION RAILWAY.....	135th Street.....	0.85	2.35

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF REMOVING OBSTRUCTIONS OF THIRD AVENUE, 42ND STREET, DRY DOCK AND KINGSBRIDGE RAILROADS, BRIEFLY STYLED AS "MANHATTAN COMPANIES"

The lengths to which the unit prices herein given are applied, are the same as the lengths of single track given under cost of reproduction of "Track."

Line	Section	Cost per Lin. Ft.
THIRD AVENUE R. R.	Park Row, Bowery, Third Ave., Post Office to 130th Street	$5.25
	Lexington Ave., 129th and 130th Sts., 66th St. 3rd Ave., to end of spur	1.65
	125th St., & Manhattan St	3.85
	Amsterdam Ave., Manhattan St., to 186th St	2.20
	Amsterdam Ave., 186th St., to loop	1.65
42ND ST., M. & ST. N. AVENUE R. R.	42nd St., E. to N. River	11.00
	7th Avenue, 42nd to 45th St., B'way, 45th to Manhattan St., First Ave., 34th St., to 42nd Street	3.30
	10th Avenue, 42nd St., to 72nd Street	1.65
DRY DOCK, E. B'WAY & BATTERY R. R. Co.	Throughout	5.50
KINGSBRIDGE RAILWAY COMPANY	162nd St., to end of line	1.65
UNION RAILWAY	135th Street	1.65

SUMMARY OF UNITS

USED IN ASCERTAINING REPRODUCTION COST OF PAVING DUE TO OBSTRUCTIONS AND CHANGE OF GRADE ON THIRD AVENUE, 42ND STREET, DRY DOCK AND KINGSBRIDGE RAILROADS, BRIEFLY STYLED AS "MANHATTAN COMPANIES"

The lengths to which the unit prices herein given are applied are the same as the lengths of single track given under cost of reproduction of "Track."

Line	Section	Cost per Lin. Ft.
Third Avenue R. R.	Park Row, Bowery and 3rd Ave., Post Office to 130th St., Lexington Ave., 129th and 130th Sts., 66th St., 3rd Ave. to end of spur.	$2.00
	125th St. and Manhattan St.	7.45
	Amsterdam Ave., Manhattan St. to 194th St	8.30
	Amsterdam Ave., 194th St. to loop	1.35
42nd St. M. & St. N. Ave. R. R.	42nd St. to E. and N. River	4.70
	7th Ave., 42nd St. to 45th St.,	
	B'way, 45th to 59th Sts	2.00
	B'way, 59th St. to 72nd St	7.45
	B'way, 72nd to Manhattan St	7.15
	10th Ave., 42nd to 72nd Sts	1.35
	First Ave., 42nd to 34th Sts	1.75
Dry Dock, E. B'way & Battery R. R.	Throughout	2.00
Kingsbridge R. R.	Kingsbridge Road, 162nd St. to end of line	1.40
Union Railway	135th Street	2.00

SUMMARY OF VALUES

USED IN ASCERTAINING REPRODUCTION COST OF TOOLS, SUPPLIES AND FIXTURES OF THIRD AVENUE, 42ND STREET, DRY DOCK, KINGSBRIDGE, UNION, BRONX TRACTION, SOUTHERN BOULEVARD, YONKERS AND WESTCHESTER RAILROADS

TOOLS:	
65th St. & 3rd Ave	$39,614
65th St. & 3rd Ave., Floating Tools	2,351
129th St. & 3rd Ave	1,101
130th St. & Amsterdam Ave	519
Grand St. Barn	755
Port Morris Depot	129
Track Dept., Union Ry. Co., Floating Tools	2,622
Lines and Feeders, Floating Tools	1,042
Kingsbridge Power Station, Fixed & Floating Tools	6,277
West Farms Sub-station, Floating Tools	1,004
West Farms Depot	9,705
West Farms Depot, Floating Tools	329
MATERIAL AND SUPPLIES:	
65th St. & 3rd Ave	176,491
129th St. & 3rd Ave	19,956
West Farms Stock Room	60,045
Kingsbridge Power Station	40,028
Bayard St. Sub-station	904
65th St. Sub-station	460
129th St. Sub-station	858
West Farms Car House	36,535
West Farms Sub-station	2,980
West Farms Various Shops in Sub-station	26,150
Old Power Station, Bronx River	9,672
Bronx River Car House	7,186
FURNITURE AND FIXTURES:	
Third Ave. R. R	9,850
Union Division	2,935
TOOLS, SUPPLIES AND FIXTURES:	
Yonkers R. R	54,409
Westchester Electric R. R	29,987
HORSES, WAGONS, ETC.:	
Third Ave. R. R	46,194
Union Division	10,680
SALVAGE ON MATERIALS AND APPARATUS:	
Third Avenue R. R	822
Union Division	5,000
SUPPLEMENTAL DRAINS:	
Third Avenue R. R	4,805
42nd Street R. R	26,146

EXHIBIT NO. 36. JANUARY 18, 1910

THIRD AVENUE REORGANIZATION

CASE NO. 1181

EXHIBIT TESTIFIED TO BY HENRY FLOY, CONSULTING ENGINEER, BEFORE PUBLIC SERVICE COMMISSION, FIRST DISTRICT, AT HEARING OF APPLICATION OF THIRD AVENUE BONDHOLDER'S COMMITTEE FOR APPROVAL OF PROPOSED NEW SECURITIES.

ESTIMATE OF PRESENT ACTUAL COST OF REPRODUCTION AND PRESENT VALUE OF TANGIBLE PROPERTIES AS A GOING-CONCERN (IRRESPECTIVE OF ANY ALLOWANCE FOR DEVELOPMENT EXPENSES).

Estimated actual cost of reproduction tangible properties, including construction and installation of plant, etc., on basis present day prices (as per itemized statement "A", p. 3; see also "B," p. 4)	$46,500,000
Deduct items not subject to depreciation, such as real estate, obstructions, paving for obstructions, etc., at least	6,500,000
Leaving to represent reproduction cost of tangible property subject to depreciation approximately	$40,000,000
Deduct maximum depreciation on said tangibles, an average of 25 p. c.	10,000,000
Leaving as present approximate value of said tangibles on basis of reproduction cost less depreciation	$30,000,000
Add items not subject to depreciation as above	6,500,000
Approximate minimum present value tangible property	$36,500,000
STATED IN DIFFERENT FORM:	
1. 75 p. c. of reproduction cost of $40,000,000 of tangibles	$30,000,000
2. Plus real estate, etc., not subject to depreciation, as above	6,500,000
Total present value	$36,500,000
REPRODUCTION COST AS ABOVE OF	$46,500,000
Includes no allowance for so-called "Development Expenses" covering promotion, discounts on securities, expenses of financing, taxes, interest, title insurance, brokers' commissions, and other general administration, legal and contingent expenses necessarily attending such an enterprise (see statement "C," p. 4). Minimum provision for these purposes should be 25 p. c., or	11,625,000
Making a total cost of reproduction to a new company	$58,125,000

NOTE. This estimate makes no allowance for franchises of Third Avenue and other companies, for loss involved in changing from horse to cable power and from cable to electricity, for obsolescence of portions of plant for good will, or for working capital.

"A"

ESTIMATED ACTUAL COST OF REPRODUCTION OF ENTIRE PHYSICAL PROPERTIES OF THIRD AVENUE PROPER, 42D STREET, DRY DOCK, UNION, SOUTHERN BOULEVARD, BRONX TRACTION, KINGSBRIDGE, YONKERS AND WESTCHESTER RAILROAD COMPANIES ON BASIS OF PRESENT-DAY PRICES.

Building structures	$ 7,205,315
Tracks	10,331,894
Paving	3,542,644
Distributing System	2,838,246
Overhead Construction	1,200,500
Duct Lines	2,116,538
Power Equipment	3,495,219
Rolling Stock	7,650,934
Removal of Obstructions	1,479,049
Paving over Obstructions	1,389,035
Real Estate	4,524,570
Tools, Supplies, Fixtures	553,165
Horses, Wagons, etc	56,874
Salvage on Materials and Apparatus	5,822
Total	$46,389,805
Purchase price Mamaroneck & Larchmont Road	110,000
Grand total	$46,499,805

"B"

INCIDENTAL AND CONTINGENT EXPENSES INCLUDED IN ACTUAL COST OF REPRODUCTION

1. Administration expenses chargeable to construction, including superintendence, inspection, accounting, salaries of officers and clerks, consents of authorities and property owners, legal, expenses, rent, printing, storeroom expenses, etc.
2. Architects' and Engineers' fees, including cost of design and testing all construction and equipment, etc.
3. Provision for various incidentals and contingencies, incomplete inventories, unforeseen requirements, etc., which practical experience has shown to be necessary.

These incidental and contingent expenses properly attributable to actual construction would certainly extend over an average of two years and constitute capital expenditures to cover which an average of at least 15 per cent. should be provided, except in the last four items in "A," as above, not requiring such allowances.

"C"

DEVELOPMENT EXPENSES

Outlay and expenditures necessarily attending organization and promotion of an enterprise such as the Third Avenue and other railroads mentioned in Statement "A," which will ordinarily average at least 25 per cent. on actual cost of construction, and in City of New York would undoubtedly average much more. These include

1. Legal and other expenses of preliminary promotion, incorporation and organization of companies, procuring property owners' consents, condemnation proceedings, arrangements for trackage rights and terminals, procuring local franchises and approval, consent and certificates from Public Service Commission and other public bodies, title examinations and insurance, brokers' commissions, etc., at least	½ of 1 p. c.
2. Technical expenses in connection with preliminary work, surveys, expert estimates, etc., approximately	½ of 1 p. c.
3. Interest on capital and bond issues, rents, and so-called wages of superintendence and administration in addition to portion similar expense chargeable to construction, etc., which must be provided to cover development stage and construction and until property can earn surplus over operating expenses and taxes sufficient to pay interest or dividends on investments. Minimum allowance[1]	8½ p. c.
4. Taxes including incorporation tax, mortgage tax, real estate tax, personal property tax, capital stock tax, franchise tax, etc., which must be provided for and paid during period from first organization to time when property will earn a net surplus over operating expenses, at least	½ of 1 p. c.
5. Discounts on securities or other customary and necessary expenditures in connection with financing such an undertaking and marketing securities. These expenses greater in case of new enterprises or reorganization of old enterprises which have become insolvent, as there is yet no established earning capacity and credit, or credit has been impaired or destroyed by insolvency. Minimum discount[2]	10 p. c.
6. Reasonable promotion profit or compensation for risk of capital estimated at 5 to 10 per cent. of cash secured and actually invested and put at risk in enterprise. Minimum allowance[3]	5 p. c.
These percentages calculated on basis of total actual reproduction cost of	$46,500,000
25 p. c. of which would be	11,625,000
Making a total cost of reproduction by a new company at least..	$58,125,000

[1] This figure would probably be exceeded in a city like New York, as also some of the other items.

[2] The allowance for these items would have to be increased under conditions now existing in City of New York. Value of all street service securities in New York at present time greatly discredited. Money could only be raised at or about par on credit of City itself.

[3] A promotion profit of at least 10 p. c. would probably be necessary to induce the investment and risk of $58,000,000 of new capital in view of present conditions and earning capacity.

EXHIBIT 39[1]

INTRODUCED BY HENRY FLOY, CONSULTING ENGINEER

VALUES OF ITEMS USED IN DETERMINING THE AMOUNT TO BE DEDUCTED FROM REPRODUCTION COST, NEW, TO OBTAIN "ABSOLUTE DEPRECIATION"

	Deferred maintenance	Obsolescence
Vaults in streets, vaults adjacent to buildings, unused boiler, engine and chimney foundations, chimneys, column footings, abandoned pits		$612,378
Buildings, (detailed estimates)	$121,900	
Abandoned track, special work and paving (Bear Swamp Road)		15,812
Track, special work and paving, (detailed estimates)	1,050,446	
Power Equipment (detailed estimates)	64,400	
Distributing System (detailed estimates)	46,000	
Overhead construction (detailed estimates)	62,410	
Rolling Stock, (detailed estimates)	57,725	667,975
Totals	$1,402,881	$1,296,165
		1,402,881
Grand Total		$2,699,046

Note.—All values herein given include the same percentages as used in obtaining the cost of reproduction new.

[1] Case No. 1181: Plan of Reorganization Third Ave. Railroad Co. Decision dated July 29, 1910, Public Service Commission, First District, New York.

EXHIBIT 40[1]

INTRODUCED BY HENRY FLOY, CONSULTING ENGINEER THIRD AVENUE RAILROAD COMPANY

CASE No. 1181

DEPRECIATION AS OF FEBRUARY, 1910, INCLUDING "ABSOLUTE" AND "THEORETICAL"

	Deferred maintenance	Wear and tear	Age inadequacy obsolescence	Totals
Obsolete Vaults and Foundations	.....	.....	$612,378	$612,378
Buildings	$121,900	$35,000	$782,329	$939,229
Track, Special Work and Paving	1,050,446	3,543,093	241,192	4,834,731
Distributing System	46,000	204,810	416,513	667,323
Overhead Construction	62,410	26,062	330,916	419,388
Duct Lines	.....	.....	199,274	199,274
Power Equipment	64,400	35,000	880,292	979,692
Rolling Stock	57,725	79,000	1,587,349	1,724,074
Tools and Fixtures	.....	3,159	52,807	55,966
Horses, Wagons, etc	.....	1,135	14,219	15,354
	$1,402,881	$3,927,259	$5,117,269	$10,447,409

[1] Case No. 1181: Plan of Reorganization Third Ave. Railroad Co. Decision dated July 29, 1910, Public Service Commission, First District, New York.

EXHIBIT

INTRODUCED BY MR. E. G. COUNETTE, ENGINEER OF THE APPRAISAL—THIRD CASE

COMPARISON OF NET VALUES AS GIVEN BY THE PUBLIC

Group	Appraiser	A 3rd Ave. & Union Rys.	B Difference	C Yonkers R. R. Co.	D Difference
(1) Buildings and Structures	P.S.C.	$5,066,933.60	.....	$356,989.00	.....
	Floy	5,184,985.74	$118,052.14	356,989.00	.....
(2) Track	P.S.C.	6,725,209.49	.....	620,020.57	.....
	Floy	6,725,209.49	.....	668,613.26	$48,592.69
(3) Paving	P.S.C.	2,017,494.86	.....	253,013.50	.....
	Floy	2,139,629.25	122,134.39	296,969.30	43,955.80
(4) Distributing system	P.S.C.	2,175,743.87	.....	83,006.53	.....
	Floy	2,175,743.87	.....	138,453.53	55,447.00
(5) Overhead distribution	P.S.C.	554,737.55	.....	166,025.24	.....
	Floy	559,651.38	4,913.83	178,616.45	12,591.21
(6) Duct lines	P.S.C.	1,571,948.62	.....	.....	.....
	Floy	1,571,948.62	.....	.....	.....
(7) Power Equipment	P.S.C.	2,661,299.65	.....	43,976.00	.....
	Floy	2,661,299.65	.....	50,507.40	6,531.40
(8) Rolling Stock	P.S.C.	6,453,097.00	.....	95,515.40	.....
	Floy	6,453,097.00	.....	106,353.90	10,838.50
(9) Removing obstructions	P.S.C.	1,169,209.00	.....	.....	.....
	Floy	1,169,209.00	[1](See note)	.....	.....
(10) Paving over obstructions	P.S.C.	1,098,052.00	.....	.....	.....
	Floy	1,098,052.00	[1](See note)	.....	.....
(11) Real Estate	P.S.C.	4,265,220.00	.....	74,000.00	.....
	Floy	4,265,220.00	.....	223,500.00	149,500.00
(12) Tools, Supplies & Fixtures	P.S.C.	460,502.00	.....	50,839.00	.....
	Floy	468,765.00	8,263.00	54,408.81	3,569.81
(13) Horses, Wagons, Etc.	P.S.C.	56,874.00	.....	.....	.....
	Floy	56,874.00	.....	.....	.....
(13) Salvage, Material & Apparatus	P.S.C.	5,822.00	.....	.....	.....
	Floy	5,822.00	.....	.....	.....
(15) Not itemised	Floy	.....	.....	.....	.....
Total	P.S.C.	$34,282,143.64	.....	$1,743,385.24	.....
	Floy	34,535,507.00	$253,363.36	2,074,411.65	$331,026.41

[1] *Note.*—The apparent equality of figures of two appraisals on items of "Removing Obstructions" and "Paving Over Obstructions" is not actual because Mr. Floy adds percentages to his net figure given above to obtain his gross figure, while the P. S. C. makes no addition to the net figure.

GWK/C.T.B 4-16-10

Checked: G. W. KUHN
J. L. M.

NO. 50

PUBLIC SERVICE COMMISSION—FIRST DISTRICT

AVENUE RAILROAD SYSTEM

No. 1181

SERVICE COMMISSION, AND AS GIVEN BY MR. HENRY FLOY

E West. Elec. R. R. Co.	F Difference	G Mamaroneck Line	H Difference	I Total	J Difference of Totals
$161,807.00	.....	.....	.....	$5,585,729.60	.....
161,807.00	.....	.....	.....	5,703,781.74	$118,052.14
624,793.72	.....	$21,936.14	$21,936.14	7,991,959.92	.....
731,684.16	$106,890.44	(c)See note	(c)See note	(c)8,125,506.91	(c)133,546.99
312,489.20	.....	11,923.22	11,923.22	2,594,920.78	.....
363,911.16	51,421.96	(c)See note	(c)See note	(c)2,800,509.71	(c)205,588.93
83,173.62	52,474.86	.....	.....	2,341,924.02	.....
30,698.76	.....	.....	.....	2,344,896.16	2,972.14
193,512.34	.....	3,365.26	3,365.26	917,640.39	.....
210,745.00	17,232.66	(c)See note	(c)See note	(c) 949,012.83	(c) 34,737.70
.....	.....	.....	.....	1,571,948.62	.....
.....	.....	.....	.....	1,571,948.62	.....
46,000.00	.....	.....	.....	2,751,275.65	.....
51,213.10	5,213.10	.....	.....	2,763,020.15	11,744.50
82,250.00	.....	.....	.....	6,630,862.40	.....
93,567.20	11,317.20	.....	.....	6,653,018.10	22,155.70
.....	.....	.....	.....	1,169,209.00	.....
.....	.....	.....	.....	1,169,209.00	.....
.....	.....	.....	.....	1 098,052.00	.....
.....	.....	.....	.....	1,098,052.00	.....
35,900.00	50.00	.....	.....	4,375,120.00	.....
35,850.00	.....	.....	.....	4,524,570.00	149,450.00
30,002.00	14.64	.....	.....	541,343.00	.....
29,987.36	.....	.....	.....	553,161.17	11,818.17
.....	.....	.....	.....	56,874.00	.....
.....	.....	.....	.....	56,874.00	.....
.....	.....	.....	.....	5,822.00	.....
.....	.....	.....	.....	5,822.00	.....
.....	.....	(c)110,000.00	(c)110,000.00	(c) 110,000.00	(c)110,000.00
$1,569,927.88	.....	$37,224.62	.....	$37,632,681.38	.....
1,709,463.74	$139,535.86	110,000.00	$72,775.38	38,429,382.39	796,701.01[2]

(c) Mr. Floy submits the purchase price of the Mamaroneck Line as his valuation of the property; he does not give itemized values, and, therefore, comparisons can not be made between group totals for this line. This should be borne in mind when dealing with figures marked (c) on this sheet.

[2] This difference is mainly due to difference in Mamaroneck Road, Yonker's real estate, and date of appraisals. Considerable property having been added after the date of closing the P. S. C. appraisal which was included by Floy.—*Author.*

EXHIBIT

INTRODUCED BY MR. E. G. COUNETTE, ENGINEER OF THIRD AVENUE CASE

DEPRECIATION

Group	R. R. Co.	Total cost to reproduce	Scrap value	Wearing value
1 Buildings and Structures.	3rd Ave. & Union....	$6,130,989.66	$443,799.60	$5,687,190.06
	Yonkers.....	431,956.69	34,124.58	397,832.11
	Westchester.....	195,786.47	15,467.13	180,319.34
	Mamaroneck.....	.....	.....	.....
	Total.....	$6,758,732.82	$493,391.31	$6,265,341.51
2. Track.....	3rd Ave. & Union....	8,137,503.49	437,273.55	7,700,229.94
	Yonkers.....	750,224.89	70,015.14	680,209.75
	Westchester.....	756,000.40	71,984.54	684,015.86
	Mamaroneck.....	26,542.73	2,527.33	24,015.40
	Total.....	$9,670,271.51	$581,800.56	$9,088,470.95
3. Paving.....	3rd Ave. & Union....	2,441,168.79	.....	2,441,168.79
	Yonkers.....	306,146.34	.....	306,146.34
	Westchester.....	378,111.93	.....	378,111.93
	Mamaroneck.....	14,427.09	.....	14,427.09
	Total.....	$3,139,854.15	.....	$3,139,854.15
4. Distribution System.	3rd Ave. & Union....	2,632,650.08	908,225.46	1,724,424.62
	Yonkers.....	100,437.90	18,354.75	82,083.15
	Westchester.....	100,640.08	18,014.93	82,625.15
	Mamaroneck.....	.....	.....	.....
	Total.....	$2,833,728.06	$944,595.14	$1,889,132.92
5. Overhead. Distribution.	3rd Ave. & Union....	671,232.44	133,506.46	537,725.98
	Yonkers.....	200,890.54	53,541.33	147,349.21
	Westchester.....	234,149.93	56,103.00	178,046.93
	Mamaroneck.....	4,071.97	532.67	3,539.30
	Total.....	$1,110,344.88	$243,638.46	$866,661.42
6. Duct Lines.....	3rd Ave. & Union....	1,902,057.83	.....	1,902,057.83
	Yonkers.....	.....	.....	.....
	Westchester.....	.....	.....	.....
	Mamaroneck.....	.....	.....	.....
	Total.....	$1,902,057.83	.....	$1,902,057.83

NO. 57

THE PUBLIC SERVICE COMMISSION—FIRST DISTRICT

RAILROAD SYSTEM

NO. 1181

OF PROPERTY

Obsolescence, inadequacy and age	Deferred maintenance	Wear and tear	Total	Remaining wear	Present value
$1,837,795.91	.....	.....	$1,837,795.91	$3,849,394.15	$4,293,193.75
101,845.02	.....	.....	101,845.02	295,987.09	330,111.67
46,161.75	.....	.....	46,161.75	134,157.59	149,624.72
.....	.....	.....	.....	.....	.....
$1,985,802.68	.....	.....	$1,985,802.68	$4,279,538.83	$4,772,930.14
201,484.54	475,669.82	2,422,524.82	3,099,679.18	4,600,550.76	5,037,824.31
.....	48,904.83	340,094.88	388,999.71	291,210.04	361,225.18
.....	41,424.61	342,008.41	383,433.02	300,582.84	372,567.38
.....	1,454.39	12,007.72	13,462.11	10,553.29	13,080.62
$201,484.54	$567,453.65	$3,116,635.83	$3,885,574.02	$5,202,869.93	$5,784,697.49
.....	443,137.49	1,220,584.39	1,663,721.88	777,446.91	777,446.91
.....	33,718.64	153,073.17	186,791.81	119,354.53	119,354.53
.....	41,568.24	189,055.97	230,624.21	147,487.72	147,487.72
.....	1,586.06	7,213.55	8,799.61	5,627.48	5,627.48
.....	$520,010.43	$1,569,927.08	$2,089,937.51	$1,049,916.64	$1,049,916.64
357,984.81	.....	165,706.46	523,691.27	1,200,733.35	2,108,958.81
15,674.01	.....	1,897.01	17,571.02	64,512.13	82,866.88
16,291.85	.....	1,219.80	17,511.65	65,113.50	83,128.43
.....	.....	.....	.....	.....	.....
$389,950.67	.....	$168,823.27	$558,773.94	$1,330,358.98	$2,274,954.12
54,707.61	.....	121,666.51	176,374.12	361,351.86	494,858.32
26,010.17	13,073.93	46,347.77	85,431.87	61,917.34	115,458.67
58,680.33	8,490.64	37,602.65	104,773.62	73,273.31	129,376.31
286.81	117.05	1,558.75	1,962.61	1,576.69	2,109.36
$139,684.92	$21,681.62	$207,175.68	$368,542.22	$498,119.20	$741,802.66
175,531.85	.....	$38,558.76	$214,090.61	$1,687,967.22	$1,687,967.22
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
$175,531.85	.....	38,558.76	214,090.61	1,687,967.22	1,687,967.22

EXHIBIT

Group	R. R. Co.	Total cost to reproduce	Scrap Value	Wearing value
7. Power Equipment.	3rd Ave. & Union..	3,220,172.58	242,755.19	2,840,755.39
	Yonkers.....	53,210.96	5,341.37	47,869.59
	Westchester.....	55,660.00	5,340.50	50,319.50
	Mamaroneck.....	.....	.....	.....
	Total.....	$3,329,043.54	[1]$253,437.06	$2,938,890.48
8. Rolling. Stock	3rd Ave. & Union..	6,775,751.85	248,850.00	6,526,901.85
	Yonkers.....	100,291.17	3,750.00	96,541.17
	Westchester.....	86,362.50	3,000.00	83,362.50
	Mamaroneck.....	.....	.....	.....
	Total.....	$6,962,405.52	$255,600.00	$6,706,805.52
9. Removing Obstructions	3rd Ave. & Union..	1,169,209.00	.....	1,169,209.00
	Yonkers.....	.....	.....	.....
	Westchester.....	.....	.....	.....
	Mamaroneck.....	.....	.....	.....
	Total.....	$1,169,209.00	.....	$1,169,209.00
10. Paving over Obstructions.	3rd Ave. & Union..	1,098,052.00	.....	1,098,052.00
	Yonkers.....	.....	.....	.....
	Westchester.....	.....	.....	.....
	Mamaroneck.....	.....	.....	.....
	Total.....	$1,098,052.00	.....	$1,098,052.00
11. Real Estate.	3rd Ave. & Union..	4,265,220.00	.....	4,265,220.00
	Yonkers.....	74,000.00	.....	74,000.00
	Westchester.....	35,900.00	.....	35,900.00
	Mamaroneck.....	.....	.....	.....
	Total.....	$4,375,120.00	.....	$4,375,120.00
12. Tools, Supplies and Fixtures.	3rd Ave. & Union..	460,502.00	.....	460,502.00
	Yonkers.....	50,839.00	.....	50,839.00
	Westchester.....	30,002.00	.....	30,002.00
	Mamaroneck.....	.....	.....	.....
	Total.....	$541,343.00	.....	$541,343.00
13. Horses, Harness and Wagons.	3rd Ave. & Union..	56,874.00	.....	56,874.00
	Yonkers.....	.....	.....	.....
	Westchester.....	.....	.....	.....
	Mamaroneck.....	.....	.....	.....
	Total.....	$56,874.00	.....	$56,874.00

"[1] A figure of $136,716, representing the Brook Ave. sub-station, is included in the Power Equipment group, and appears in the columns for *Cost to Reproduce* and *Present Value*, but does not appear in the other columns in the group. The apparent discrepancy will be avoided by subtracting this figure of $136,716 from the figure for *Cost to Reproduce* before making computations

NO. 57—*Continued*

Obsolescence, inadequacy and age	Deferred maintenance	Wear and tear	Total	Remaining wear	Present value
922,123.91			922,123.91	1,918,577.48	2,298,048.67
16,754.36			16,754.36	31,115.23	36,456.60
17,611.83			17,611.83	32,707.67	38,048.17
$956,490.10			$956,490.10	$1,982,400.38	$2,372,553.44
1,585,603.07			1,585,603.07	4,941,298.78	5,190,148.78
27,754.79			27,754.79	68,786.38	72,536.38
8,336.25			8,336.25	75,026.25	78,026.25
$1,621,694.11			$1,621,694.11	$5,085,111.41	$5,340,711.41
				1,169,209.00	1,169,209.00
				$1,169,209.00	$1,169,209.00
				1,098,052.00	1,098,052.00
				$1,098,052.00	$1,098,052.00
				4,265,220.00	4,265,220.00
				74,000.00	74,000.00
				35,900.00	35,900.00
				$4,375,120.00	$4,375,120.00
		115,125.50	115,125.50	345,376.50	345,376.50
		12,709.75	12,709.75	38,129.25	38,129.25
		7,500.50	7,500.50	22,501.50	22,501.50
		$135,335.75	$135,335.75	$406,007.25	$406,007.25
		14,218.50	14,218.50	42,655.50	42,655.50
		$14,218.50	$14,218.50	$42,655.50	$42,655.50

and then adding it to the result of the computations and in order to obtain the Present Value. This figure was treated in this manner because a scrap value could not be obtained owing to the fact that an estimated value for the sub-station was used, although the sub-station was not complete at the time of appraisal."

EXHIBIT

Group	R. R. Co.	Total cost to reproduce	Scrap value	Wearing value
14. Salvage Material and Apparatus.	3rd Ave. & Union....	5,822.00	.....	5,822.00
	Yonkers.....	.....	.....	.....
	Westchester.....	.....	.....	.....
	Mamaroneck.....	.....	.....	.....
	Total.....	$5,822.00	.....	$5,822.00
Total.....	3rd Ave. & Union....	38,967,205.72	2,414,410.26	36,416,079.46
	Yonkers.....	2,067,997.49	185,127.17	1,882,870.32
	Westchester.....	1,872,613.31	169,910.10	1,702,703.21
	Mamaroneck.....	45,041.79	3,060.00	41,981.79
Total of Totals....	.....	$42,952,858.31	$2,772,507.53	$40,043,634.78

April 29, 1910.
GWK/CTB.
Checked:

NO. 57—*Continued*

Obsolescence, inadequacy and age	Deferred maintenance	Wear and tear	Total	Remaining wear	Present value
.....	.....	1,455.50	1,455.50	4,366.50	4,366.50
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	$1,455.50	$1,455.50	$4,366.50	$4,366.50
5,135,231.70	918,807.31	4,099,840.44	10,153,879.45	26,262,200.01	28,813,326.27
188,038.35	95,697.40	554,122.58	837,858.33	1,045,011.99	1,230,139.16
147,082.01	91,483.49	577,387.33	815,952.83	886,750.38	1,056,660.48
286.81	3,157.50	20,780.02	24,224.33	17,757.46	20,817.46
$5,470,638.87	$1,109,145.70	$5,252,130.37	$11,831,914.94	$28,211,719.84	$31,120,943.37

EXHIBIT

INTRODUCED BY MR. E. A. COUNETTE, ENGINEER

FIRST

THIRD AVENUE

CASE

COMPARISON OF DEPRECIATION AS GIVEN BY HENRY FLOY IN

Group	Appraiser	Obsolescence, inadequacy and age	Difference	Deferred maintenance
Buildings and Structures	Floy	$1,394,707.00	.....	$121,900.00
	P. S. C.	1,985,802.68	$591,095.68	.....
Track and Paving	Floy	241,192.00	39,707.46	1,050,446.00
	P. S. C.	201,484.54	.....	1,087,464.08
Distributing System	Floy	416,513.00	26,562.33	46,000.00
	P. S. C.	389,950.67	.....	.....
Overhead Distribution	Floy	390,916.00	191,213.08	62,410.00
	P. S. C.	139,684.92	.....	21,681.62
Duct Lines	Floy	199,274.00	23,742.15	.....
	P. S. C.	175,531.85	.....	.....
Power Equipment	Floy	880,292.00	.....	64,400.00
	P. S. C.	956,490.10	76,198.10	.....
Rolling Stock	Floy	1,587,349.00	.....	57,725.00
	P. S. C.	1,621,694.11	34,345.11	.....
Tools and Fixtures	Floy	52,807.00	52,807.00	.....
	P. S. C.	.....	.....	.....
Horses, Wagons, etc.	Floy	14,219.00	14,219.00	.....
	P. S. C.	.....	.....	.....
Totals	Floy	5,117,269.00	.....	1,402,881.00
	P. S. C.	$5,470,638.87	$353,369.87	$1,109,145.70

[1] Case No. 1181 Plan of Reorganisation Third Ave. Railroad Co. Decision dated July 29, 1910, Public Service Commission, First District, New York.

Note.—In order to make comparison easier, Mr. Floy's figure for obsolete vaults and foundations was included with his figure for buildings. For the same reason, the figure of

NO. 58[1]

FOR THE PUBLIC SERVICE COMMISSION

DISTRICT

RAILROAD SYSTEM

No. 1181

EXHIBIT 35 AND AS PREPARED BY PUBLIC SERVICE COMMISSION

Difference	Wear and tear	Difference	Total depreciation	Difference
$121,900.00	$35,000.00	$35,000.00	$1,551,607.00	.....
.....	.....	.....	1,985,802.68	$434,195.68
	3,543,093.00	.....	4,834,731.00	.....
37,018.08	4,686,562.91	1,143,469.91	5,979,511.53	1,140,780.53
46,000.00	204,810.00	35,986.73	667,323.00	108,549.06
	168,823.27	.....	558,773.94	.....
40,728.38	26,062.00	.....	419,388.00	50,845.78
	207,175.68	181,113.68	368,542.22	.....
	.....	.....	199,274.00	.....
.....	38,558.76	38,558.76	214,090.61	14,816.61
64,400.00	35,000.00	35,000.00	979,692.00	23,201.90
.....	.....	.....	956,490.00	.....
57,725.00	79,000.00	79,000.00	1,724,074.00	102,379.89
.....	.....	.....	1,621,694.11	.....
.....	3,159.00	.....	55,966.00	.....
.....	135,335.75	132,176.75	135,335.75	79,369.75
.....	1,135.00	.....	15,354.00	.....
.....	15,674.00	14,539.00	15,674.00	320.00
293,735.30	3,927,259.00	.....	10,447,409.00	.....
.....	$5,252,130.37	$1,324,871.37	$11,831,914.94	$1,384,505.94

the P. S. C. for salvage material and apparatus was included with their figure for horses, harness and wagons.
April 29, 1910.
Checked by: J. L. M

EXHIBIT NO. 69

TRANSFER CASE, NO. 1364

PUBLIC SERVICE COMMISSION

ESTIMATED COST OF REPRODUCTION OF THE EXISTING PROPERTY OF THE THIRD AVENUE RAILROAD AS OF JUNE 30, 1911, BEING APPRAISAL BY HENRY FLOY, CONSULTING ENGINEER

TABLE I

(SHOWING CONSTRUCTION COST AND EXCLUDING "DEVELOPMENT EXPENSES.")

Physical property	Third Ave.	42d Street, St. N. & M.	Dry Dock	Kingsbridge	Total
Buildings and Structures...	$5,109,673	$309,869	$723,434	.....	$6,142,976
Track, including Special Work, Excavation and Drains.	3,043,665	1,755,523	837,993	$666,195	6,303,376
Paving, Straight Track and Special Work.	536,559	324,268	277,674	134,760	1,273,261
Distribution System, Cable Fittings, Conductor Bars, Bonds and Taps.	1,392,069	443,148	145,337	186,361	2,166,915
Ducts, including Manholes and Paving.	933,657	438,750	118,847	163,252	1,654,506
Power Equipment, Electrical and Mechanical.	3,122,201	19,785	.....	.....	3,141,986
Rolling Stock.....	5,433,299	545,353	28,175	.....	6,006,827
Removal of Obstructions...	1,429,025	1,148,181	387,687	66,889	3,031,782
Paving Over Obstructions..	736,320	479,747	112,524	56,926	1,385,517
Real Estate (as per valuation of C. E. Schuyler).	3,212,364	381,472	799,664	.....	4,393,500
Tools, Supplies, Fixtures...	461,961	81	755	.....	462,797
Horses, Wagons, etc.....	31,426	2,080	28,153	.....	61,659
Working Capital.....	500,000	98,000	52,000	.....	650,000
Carrying Cost:					
(a) Interest during construction, average period, 1 1/2 years, at 6 per cent.	2,334,800	535,163	316,102	114,694	3,300,759
(b) Taxes during construction, average period, 2 years.	170,000	13,000	25,000	.....	208,000
Total cost of construction as of June 30, 1911.	$28,447,019	$6,494,420	$3,853,345	$1,389,077	$40,183,861

TABLE II

DEVELOPMENT EXPENSES

Non-physical property	Third Ave.	42d Street, St. N. & M.	Dry Dock	Kingsbridge	Total
Legal and administration expenses prior to and in connection with incorporation and organization, including technical expenses for preliminary work, surveys, expert estimates, etc., minimum allowance.	$200,000	$100,000	$75,000	$50,000	$425,000
Legal and administration expenses in procuring consents and certificates of Public Service Commission and other public bodies, condemnation proceedings, arrangements for trackage rights, terminals, etc., minimum allowance.	200,000	100,000	50,000	25,000	375,000
Procuring property owners' consents.	360,000	280,000	200,000	90,000	930,000
Cost of administration and wages of superintendence during period of construction, not chargeable to or included in estimate of construction, minimum allowance.	350,000	75,000	40,000	10,000	475,000
Taxes (other than those estimated as part of carrying cost).	88,000	21,000	16,000	4,500	129,500
Interest on development expenses during construction period, minimum allowance.	143,760	69,120	45,720	21,540	280,140
Title examination, title guarantee fees, real estate, brokers' commissions, insurance, etc., not chargeable to construction.	50,000	5,000	10,000	.....	65,000
Bankers' commissions and other customary and necessary expenditures in connection with financing such an enterprise and raising funds, minimum allowance.	750,000	175,000	125,000	40,000	1,090,000
Total.....	$2,141,760	$825,120	$561,720	$241,040	$3,769,640

TABLE III

ESTIMATED COST OF REPRODUCTION

Physical and non-physical property	Third Ave.	42 dStreet, St. N. & M.	Dry Dock	Kingsbridge	Total
Construction cost	$28,447,019	$6,494,420	$3,853,345	$1,389,077	$40,183,861
Development expense	2,141,760	825,120	561,720	241,040	3,769,640
Total	$30,588,779	$7,319,540	$4,415,065	$1,630,117	$43,953,501

EXHIBIT NO. 74

TRANSFER CASE, NO. 1364

PUBLIC SERVICE COMMISSION

FIRST DISTRICT

THIRD AVENUE RAILROAD CO.

HENRY FLOY CONSULTING ENGINEER

PROPERTY IN TABLE I, EXHIBIT NO. 69

NOT NOW USED FOR RAILROAD OPERATION

(SUMMARY)

Physical property	Third Avenue	42nd Street, St. N. & M.	Dry Dock	Kingsbridge	Total
Buildings & Structures	$47,390	$117,212	$551,206	.....	$715,808
Track, incl. Special Work, and Paving.	.....	25,513	84,107	.....	109,620
Rolling Stock leased to other companies of the Third Avenue System.	3,650,155	86,227	.....	.....	3,736,382
Real Estate	155,210	259,628	586,391	.....	1,001,229
Interest during construction.	346,748	43,972	109,953	.....	500,673
Taxes	8,000	4,500	7,000	.....	19,500
Total	$4,207,503	$537,052	$1,338,657	.....	$6,083,212

PROPERTY IN TABLE I EXHIBIT NO. 69

NOT NOW USED FOR RAILROAD OPERATION

(Summary of Details)

BUILDINGS:	
DRY DOCK:	
Grand, Corlears & Monroe Sts., entire.....	$79,666
(Building rented to Metropolitan St. Ry. Co.)	
Cherry, Corlears, Monroe & Grand Sts.....	176,910
(About 95 per cent. of building rented to Metropolitan Street Railway Co.)	
14th Street & Avenue B.....	294,630
(About 87 per cent. of building rented to Metropolitan Street Railway Co.)	
	$551,206
42ND STREET:	
42nd Street & Lexington Ave., entire.....	$35,947
(Building rented for commercial purposes.)	
Manhattan St. & 129th St., entire, part B.....	76,522
(Building rented for commercial purposes.)	
12th Ave. & Manhattan St., part B, entire.....	4,743
(Building rented for commercial purposes.)	
	$117,212
THIRD AVENUE:	
Bayard St. Estimated value of part rented for commercial purposes.....	$40,000
Amsterdam Ave. & 186th St., entire.....	7,390
(Building rented for commercial purposes.)	
	$47,390
Grand Total.....	$715,808
TRACKS, SPECIAL WORK & PAVING:	
DRY DOCK:	
Lewis St., Grand to 8th St.....	
8th St., Lewis to Ave. D.....	
Columbia St. & Ave. D., Grand to 14th St.....	
14th St., Ave. D. to Ave. B.....	
Avenue A., 23rd to 24th St.....	
Lispenard St., from Church to Broadway.....	$75,126
Track in car barns, 14th St., Corlears, Monroe.....	8,981
Total.....	$84,107

42ND STREET:	
109th St., Pleasant Ave. to end of line	
Pleasant Ave., 109th to 110th St	
110th St., near East River, changes .052 miles	
86th St., Amsterdam Ave. to river	
12th Avenue, 34th to 35th St	
TOTAL	$25,513
GRAND TOTAL	$109,620
ROLLING STOCK:	
THIRD AVENUE:	
179 New P. A. Y. E. convertible cars	
20 New P. A. Y. E. box cars	
258 Re-built P. A. Y. E. cars	
232 12 B. open cars	
60 22′ single truck cars	
TOTAL	$3,650,155
42ND STREET:	
23 Storage Battery cars	
TOTAL	86,227
GRAND TOTAL	$3,736,382
REAL ESTATE:	
DRY DOCK:	
Grand, Corlears & Monroe Sts., entire	$86,000
(Building rented to Metropolitan St. Ry. Co.)	
Cherry, Corlears, Monroe and Grand Sts	141,516
(About 95 per cent. of building rented to Metropolitan Street Railway Co.)	
14th St. & Ave. B	358,875
(About 87 per cent. of building rented to Metropolitan Street Railway Co.)	
	$586,391
THIRD AVENUE:	
Bayard St. (See note under buildings)	$32,000
(Building rented for Commercial purposes.)	
Amsterdam Ave. & 186th St., entire	117,480
(Building rented for Commercial purposes.)	
On account of Real Estate purchased	5,730
	$155,210

42ND STREET:	
42nd Street & Lexington Avenue, entire	$170,000
(Building rented for Commercial purposes.)	
Manhattan Street & 129th St., part B, entire.....	88,000
(Building rented for Commercial purposes.)	
12th Ave. & Manhattan St., part B, entire.....	1,628
(Building rented for Commercial purposes.)	
	$259,628
GRAND TOTAL.....	$1,001,229

EXHIBIT NO. 73

CASE NO. 1364

REPRODUCTION VALUE

PUBLIC SERVICE COMMISSION

FIRST DISTRICT

THIRD AVENUE RAILROAD CO.

AVERAGE UNIT PRICES PER FOOT OF SINGLE TRACK USED IN ASCERTAINING REPRODUCTION COST OF REMOVING OBSTRUCTIONS ON THE THIRD AVE., 42ND STREET, DRY DOCK AND KINGSBRIDGE RAILROADS

Line	Section	Cost per lin. ft.
Third Avenue R. R....	Park Row, Bowery, Third Ave., Post Office to 130th St.	$11.75
	Lexington Ave., 129th St. & 130th Street, 66th St., 3rd Ave. to end of spur.	1.50
	125th St. & Manhattan St	3.50
	Amsterdam Ave., Manhattan St. to 186th St.....	2.00
	Amsterdam Ave., 186th St. to loop.....	1.50
42nd St., M. & St. N. Avenue R. R.	42nd St. E. to N. River	35.00
	7th Ave., 42nd St. to 45th St., B'way, 45th to Manhattan St., First Avenue, 34th St., to 42nd St.	3.00
	10th Ave., 42nd St. to 72nd St.....	1.50
Dry Dock, E. Bdwy & Battery R. R. Co.	Throughout.....	8.70
Kingsbridge Railway Company.	162nd St. to end of line	1.50

EXHIBIT NO. 133

CASE NO. 1364

REPRODUCTION VALUE

THIRD AVENUE RAILROAD CO.

CONDUIT TRACK

42ND ST., MANHATTANVILLE & ST. NICHOLAS AVENUE R. R.

Location	Length S. T.	Est. No.	Unit price $	Total $	Ownership	
					Partial $	Indeterminate $
42nd St. Line						
End Line–Lex. Ave..	4,322.13	D_1.....	10.16	43,912.84	.....	.....
Lex. Ave.–Park Ave...	862.78	D_2 Dup...	12.43	.....	.....	10,724.36
Park Ave.–Mad. Ave.	653.77	C_1 Dup..	11.86	.....	.....	7,753.71
Mad. Ave.–End Line.	12,613.92	D_1.....	10.16	128,157.43		
7th Ave.						
42nd St. S. of 45	1,015.50	D_2 Dup...	12.43	.....	.....	12,622.67
Broadway Line						
7th Ave.–Beg. Duplex	7,570.24	D_1.....	10.16	76,913.64		
Beg. Duplex–9th Ave.	2,976.74	D_2 Dup...	12.43	.....	.....	37,000.88
9th Ave.–10th Ave...	3,420.01	C_2 Dup...	12.08	.....	.....	41,313.72
10th Ave.–125th St...	28,667.47	D_2.....	10.36	296,994.99	.....	.....
125th St.–Manh. St..	1,444.50	D_2 Dup...	12.43	.....	.....	17,955.14
10th Ave. Line						
42nd St.–53rd St.....	5,603.11	C_1 Dup$_B$.	6.77	.....	37,933.05	
53rd St.–59th St.....	2,954.71	C_1 Dup$_B$.	11.86	.....	.....	35,042.86
59th St.–B'way.....	6,161.20	D_1.....	10.16	62,597.79		
1st Avenue						
42nd St.–34th St....	3,869.00	C_1 Dup$_B$.	6.77	.....	26,193.13	
Totals.....	82,135.08	ft.....	.....	$608,576.69	$64,126.18 608,576.69	$162,413.35
Total assigned...	.....	.....	.....	.....	$672,702.87	672,702.87
Grand Total.....	.....	.....	.....	.....	.....	$835,116.22

EXHIBIT NO. 133

CASE NO. 1364

REPRODUCTION VALUE

THIRD AVENUE RAILROAD CO.

BOILERS AND ACCESSORIES:

Division I. Boilers, Settings, Furnaces and Linings, Stop Valves, Water Columns, etc.

NUMBER AND ARRANGEMENT OF BOILERS:

Thirty (30) 520 H.P. Water Tube Boilers located on two floors, with fifteen (15) boilers on each floor.

Twenty-eight (28) of these boilers are arranged in fourteen (14) batteries of two (2) each. Four (4) of these boilers are equipped with superheaters of the internal U tube type.

Two (2) boilers are arranged in single settings.

DIMENSIONS AND HEATING SURFACE OF BOILERS:

Three (3) Drums 42″ diam. x 23′–3″ long, built of 1/2″ O. H. steel plate with tensile strength of 56,000 lb. per sq. in.

Two hundred fifty-two (252) 4″ tubes, 18 ft. long arranged in two (2) horizontal divisions, each 6 high and 21 wide with a total of 12 high and 21 wide. Tubes set in steel headers. Baffling arranged in two (2) vertical division walls.

Total heating surface 5200 sq. ft.

Working Pressure 200 lb.

BOILER SETTINGS, DIMENSIONS, ETC.:

Battery of two (2) boilers 23′–11 1/2″ long x 30′–8″ wide x 19′–9″ high.

Single Setting—23′–11 1/2″ long x 15′–4″ wide x 19′–9″ high.

Boilers are suspended from "I" beams carried between supporting columns.

Rear wall of brick 12″ thick including 4″ fire brick lining.

Side walls of brick 17″ thick including 5″ fire brick lining.

Center wall of brick 34″ thick at base, 32″ thick at top.

Drums are covered with 4″ brick set rowlock.

BOILER FITTINGS:

Boiler Fittings include, Safety Valves, Stop Valves, Water Columns and Connections, Superheater Drains & Blow-down Valve.

24 Boilers in Batteries of 2 each	at $14.	B.H.P.	$174,720.00
2 Boilers single setting	at 14.16	B.H.P.	14,750.00
4 Boilers in Batteries of 2 each with super-heaters.	at 15.00	B.H.P.	31,200.00
			$220,670.00
Plus 10 per cent. for Contractor's Profit			22,067.00
Cost to Reproduce as above			$242,737.00

EXHIBIT NO 133

CASE NO. 1364

REPRODUCTION VALUE

THIRD AVENUE RAILROAD CO.

CABLES—HIGH AND LOW TENSION

4/0 HIGH TENSION, 3 CONDUCTOR:		
Total measured length	402,237 ft.	
Allowance for sag, etc., 2 per cent	8,045 ft.	
Total length to replace	410,282 ft.	
410,282 ft. at $1.085 plus $0.10 = $1.185		$486,184.17
1,000,000 C. M. LOW TENSION:		
Total measured length	390,870 ft.	
Allowance for sag, etc., 3 per cent	11,726 ft.	
Total length to replace	402,596 ft.	
402,596 ft. at $0.995 plus $0.06 = $1.055		$424,738.78
500,000 C. M. LOW TENSION:		
Total measured length	3,140 ft.	
Allowance for sag, etc., 3 per cent	94 ft.	
Total length to replace	3,234 ft.	
3234 ft. at $0.587 plus $0.05 = $0.637		2,060.06
Total		$912,983.01
Plus 10 per cent. profit		91,298.30
		$1,004,281.31

Metropolitan Street Railway Company.—The Bond-holders of the Metropolitan Street Railway properties, aggregating 140 miles of surface railways in New York City, applied to the Public Service Commission of New York, First District, early in 1911 for approval of a proposed plan of reorganization of the system along the general lines already described in the preceding pages under the heading "Third Avenue Railroad Company."

Before the Court of Appeals had decided the Third Avenue case, the Bond-holders committee of the Metropolitan Company had engaged engineers, Messrs. Ford, Bacon and Davis of New York City, and they had completed an appraisal and submitted their figures at hearings before the Commission. The Commission's Engineers had also completed their appraisal of the Metropolitan properties and submitted the results of their analysis,

when the matter of valuation was practically ignored and the Metropolitan plan of reorganization was carried through on the basis proposed by the committee, under the court's decision in the Third Avenue case, the Commission approving the proposed plan, although finding the total value of the property amounted, in its opinion, to only $78,501,000, of which $12,000,000 was for real estate, $46,000,000 for plant, $16,151,000 for franchise and development expenses, the balance $4,350,000 being "contingent assets."

The results of the appraisals, however, made by the two sets of engineers, are none the less interesting because they were not used as the basis of the final decision of the Commission. The appraisals cost many thousands of dollars both to the Company and to the Commission and the care with which the work was carried out is indicated in the following exhibits introduced from the testimony in the case.

Exhibit No. 13 is a voluminous exhibit of over one hundred large pages, giving the values as found by the engineers for the Bond-holders. Only pages 1, 2 and 3 of the exhibit, being summaries of the remaining pages, are here reproduced. It will be noted that the appraisal included and allowed 10 per cent. for general-contractor and 5 per cent. for engineering, figures which are becoming quite generally accepted in appraisal work. Incidentals, instead of being allowed for by a definite percentage, were figured for each of twenty-four separate items shown in Exhibit No. 14. It should be noted that these incidentals, which include omissions, figured in the way indicated amounted to 8.8 per cent. on the estimated cost of reproduction of the physical property, to which 10 per cent. for contractors' profit, then 5 per cent. for engineering were added, making a total allowance on this account slightly greater than but a close check on the very usual figure of 10 per cent.

In addition to the cost of reproduction, the present value was estimated, being figured for theoretical depreciation on a 5 per cent. sinking fund basis, and Exhibit No. 19 was introduced as showing the results obtained by the Bond-holder's engineers in respect to this matter.

The Public Service Commission's engineer introduced Exhibit No. 41 which corresponds very closely, as to net cost, with the Bond-holders figures as to reproduction new. The Commission's engineer allowed a general contractor's profit of 10

per cent. on the cost of similar construction and equipment to that allowed in the Third Avenue case, with a further allowance of 15 per cent. for engineering incidentals, omissions, etc., on the items, where only 10 per cent. had been allowed in the Third Avenue appraisal. Depreciation was figured on the straight line basis, as is usual with the New York Commission, and in this respect differed by a very large amount, $7,500,000, from the amount of depreciation as determined by the engineers for the Bond-holders. Nothing can better illustrate the confused thought of engineers, Public Service Commissions and Utility Corporation managements than this enormous difference as to the present value of physical property, due to two diverse but well approved methods of figuring theoretical depreciation.

As indicating the care with which the appraisal work in New York City is being done, typical pages from Exhibit No. 12, showing details supporting Exhibit No. 13 introduced by the engineers for the Bond-holders, are here reproduced.

EXHIBIT NO. 13 (PAGES 1, 2 AND 3)

METROPOLITAN REORGANIZATION CASE NO. 1305

FORD, BACON & DAVIS, ENGINEERS

PUBLIC SERVICE COMMISSION—FIRST DISTRICT

SUMMARY

1. Cost of Reproduction of Metropolitan Street Railway System, as below	$102,206,240
2. Reorganization assets not included in Item 1, consisting of (*a*) cash, and (*b*) bonds ($1,200,000) and stock ($300,000) of Central Park, North & East River R. R. Co., as estimated by Reorganization Committee, at least	5,000,000
	$107,206,240
3. Add Net Investment in Superseded Property below	13,355,645
Total	$120,561,885

This summary does not include any:

(*a*) "Going concern" value, of the character recognized by authoritative decisions,

(*b*) Value of claims against various street surface railway companies, described in Lot Thirteen of Supplemental Decree of Foreclosure of "4 per cent. Mortgage,"

(*c*) Special Value of land for street railway purposes, as distinguished from ordinary purposes,

(*d*) Profits of promotion,

(*e*) Discounts on securities,

(*f*) Special value of existing franchises.

ESTIMATED COST OF REPRODUCTION, NEW, AS EXISTING, OF THE PROPERTY OF THE METROPOLITAN STREET RAILWAY SYSTEM

(CONSIDERED AS THIRTEEN CORPORATIONS)

AS OF OCTOBER 1, 1910

	Item	Total
I. DEVELOPMENT.		
1. Development Period (Obtaining Rights and Capital).		
A. Rights.		
a. Time and Expense of Development Organization and Legal and technical Departments (Inventory Priced)	$3,061,980	
b. Cost of property owners' consents (Estimated)	2,529,700	$5,591,680
B. Capital.		
a. Time and Expense of Development Organization and Legal and Technical Departments (Inventory Priced)		438,600
C. Interest on Development Expenditures during Development period (Computed)		802,417
2. Construction Period (Expenditure of Capital to Completion of Construction):		
A. Rights (Completion).		
a. Time and Exp. of Permanent Organization (Inventory Priced)	183,000	
b. Initial Payments for franchises and trackage rights (Estimated)	4,814,800	4,997,800
B. Capital (Completion).		
a. Time and Exp. of Permanent Organization (Inventory Priced)	$1,233,750	
b. Payments to Underwriting Syndicates (Estimated)	2,500,000	3,733,750
C. Interest on Development Expenditures during Construction Period (Computed)		2,533,407
Total Cost of Development		$18,097,654

II. CONSTRUCTION.		
1. Permanent Organization, Time and Expense on Construction (Inventory Priced)		732,250
2. Cost of Franchise Security Deposits (Estimated)		740,000
3. Cost of Reproducing Land (Exclusive of special value for street railway purposes) (Appraisal by W. H. Wheelock)		13,808,987
4. Cost of Construction and Equipment based partly on Labor and Material and partly on Sub-Contracts, and as of Jan. 1, 1909, or dates shown in Inventories.		
a. Straight track and paving, electric (Invent. Priced)	$13,983,662	
b. Special, track and paving, electric (Invent. Priced)	2,319,189	
c. Horse track and paving, straight and special (Invent. Priced)	1,317,657	
d. Ducts laid with track (Invent. Priced).	1,485,169	
e. Ducts laid separate from track (Invent. Priced)	858,854	
f. Feeder cables and telephone system (Invent. Priced)	3,524,468	
g. Power Plant and sub-station apparatus (Invent. Priced)	4,256,939	
h. Buildings (Invent. Priced)	8,157,900	
i. Equipment of bldgs. (Invent. Priced).	608,609	
j. Rolling stock, electric (Invent. Priced)	8,148,019	
k. Rolling stock, horse (Invent. Priced).	710,399	
l. Fixed tools and appliances (Invent. Priced)	221,013	
m. 4th Ave. tunnel (Invent. Priced)	466,356	
n. Incidentals (Invent. Priced)	3,901,024	
		49,959,258
5. General Contractor 10 per cent. of Items 4 *a-n*		4,995,926
6. Cost of Engineering, 5 per cent. of Items 4–5		2,747,759
7. Interest and Taxes during Construction (Computed)		7,333,723

8. Furniture and Fixt., Implements and Apparatus.		
a. Stores and supplies (Invent. Priced)..	$1,518,512	
b. Office furniture and fixtures (Invent. Priced).....	170,953	
c. Floating tools, wagons, etc. (Invent. Priced).....	131,886	
d. Incidentals (5 per cent. of Items 8 *b* and *c*).....	15,142	
		$1,836,493
9. Working Capital (Compiled from Receivers' Balance Sheet).....		1,182,434
Total cost of Construction, as of dates of Inventories.....		$83,336,830
10. Cost of Construction added from dates of Inventories to Oct. 1, 1910.....		771,756
Total cost of Construction, as of Oct. 1, 1910.....		$84,108,586
Total cost of Reproduction, as of October 1, 1910 (Subject to exceptions noted below).....		$102,206,240

NOTE: The above estimate does not include any:

(*a*) "Going Concern" value, of the character recognized by authoritative decisions,

(*b*) Value of claims against various street surface railway companies, described in Lot Thirteen of Supplemental Decree of Foreclosure of "4 per cent. Mortgage,"

(*c*) Special values of land for street railway purposes, as distinguished from ordinary purposes,

(*d*) Profits of promotion,

(*e*) Discounts on securities,

(*f*) Special value of existing franchises,

(*g*) Reorganization assets not included in estimated cost of reproduction,

(*h*) Net investment in superseded property.

EXHIBIT

METROPOLITAN STREET

PLAN FOR

CASE

COST TO REPRODUCE, DEPRECIATION AND PRESENT VALUE AS

Item	Net cost	Contractor's profit	Net cost plus contractor's profit	Incidentals, administration, engineering, etc.
Electric Track:				
Removal of obstructions, including pavement	$3,234,070.00	.....	$3,234,070.00	.....
Foundation and excavation	7,337,020.00	$733,702.00	8,070,722.00	$1,210,608.30
Paving in track	2,096,643.00	209,664.30	2,306,307.30	345,946.10
Tram rail, straight track	1,552,157.00	155,215.70	1,707,372.70	256,105.91
Slot rail	549,743.00	54,974.30	604,717.30	90,707.60
Conductor lines	487,164.00	48,716.40	535,880.40	80,382.06
Special work and paving	1,168,141.00	116,814.10	1,284,955.10	192,743.27
Horse track and special work	1,123,791.00	112,379.10	1,236,170.10	185,425.52
Ducts	2,444,899.00	244,489.90	2,689,388.90	403,408.34
Cables	3,522,689.00	352,268.90	3,874,957.90	581,243.69
Power plants and substations	4,276,177.00	427,617.70	4,703,794.70	705,569.21
Buildings	8,439,606.00	843,960.60	9,283,566.60	1,392,534.99
Buildings—Equipment	244,387.00	24,438.70	268,825.70	40,323.86
Electric cars	8,546,112.00	.....	8,546,112.00	427,305.60
Horse cars	677,830.00	.....	677,830.00	33,891.50
Fixed tools and appliances	137,798.00	.....	137,798.00	.....
4th Avenue tunnel	466,356.00	.....	466,356.00	69,953.40
Stores and supplies	1,623,519.00	.....	1,623,519.00	.....
Office furniture and fixtures	106,052.00	.....	106,052.00	.....
Floating tools	130,694.00	.....	130,694.00	.....
	$48,164,848.00	$3,324,241.70	$51,489,089.70	$6,016,149.35

Computer: FGD.
Checker: WCB.
July 17, 1911 (CTB.)
Inv. No. 3785.
TRANSPORTATION DEPARTMENT.

NO. 41

RAILWAY COMPANY

REORGANIZATION

No. 1305

PREPARED BY ENGINEERS OF PUBLIC SERVICE COMMISSION

Cost to reproduce	Salvage value	Wearing value	Depreciation	Present value
$3,234,070.00	.....	$3,234,070.00	.....	$3,234,070.00
9,281,330.30	$534,047.75	8,747,282.55	$1,602,794.83	8,218,535.47
2,652,253.40	.....	2,652,253.40	1,326,126.70	1,326,126.70
1,963,478.61	352,189.16	1,611,289.45	805,644.72	1,157,833.89
695,424.90	185,831.44	509,593.46	254,796.73	440,628.17
616,262.46	68,670.13	547,592.33	273,796.17	342,466.29
1,477,698.37	163,108.35	1,314,590.02	657,295.01	820,403.36
1,421,595.62	76,865.68	1,344,729.94	672,364.97	740,230.65
3,092,797.24	.....	3,092,797.24	375,774.86	2,717,022.38
4,466,201.59	1,270,730.45	3,185,471.14	1,600,699.25	2,855,502.34
5,409,363.91	1,081,872.78	4,327,491.13	1,525,440.62	3,883,923.29
10,676,101.59	.....	10,676,101.59	1,740,204.56	8,935,897.03
309,149.56	61,829.91	247,319.65	40,313.10	268,836.46
8,973,417.60	347,719.93	8,625,697.67	3,730,614.24	5,242,803.36
711,721.50	5,515.84	706,205.66	643,000.25	68,721.25
137,793.00	27,559.60	110,238.40	27,559.60	110,238.40
536,309.40	.....	536,309.40	.....	536,309.40
1,623,519.00	.....	1,623,519.00	.....	1,623,519.00
106,052.00	.....	106,052.00	26,513.00	79,539.00
130,694.00	.....	130,694.00	32,673.50	98,020.50
$57,505,239.05	$4,175,941.02	$53,329,298.03	$14,795,612.11	$42,709,626.94

EXHIBIT NO. 14

METROPOLITAN REORGANIZATION CASE No. 1305

FORD, BACON AND DAVIS, ENGINEERS

PUBLIC SERVICE COMMISSION.—FIRST DISTRICT

DETAILS OF INCIDENTALS

Item	Track paving and special work	Cars and equipment	Power plant and cables	Buildings and equipment	Total
(a) Incomplete inventories	$209,000	$81,453	$189,318	$171,326	$651,097
(b) Breakage and waste material, rehandling material	.....	5,098	26,804	67,831	99,733
(c) Delays	.....	Neg.	.....	68,530	68,530
(e) Weather damage	.....	Neg.	.....	Neg.	.....
(f) Accidents above insurance policies, careless blasting, etc	50,160	.....	2,610	17,130	69,900
(g) Temporary work	.....	4,180	590,000	77,094	671,274
(h) Tracing, demurrage, express, etc	48,000	.....	Neg.	34,264	82,264
(i) Miscellaneous oil, waste, ice, etc	46,658	4,452	1,200	2,500	54,810
(j) Broken and lost tools, etc	167,195	4,242	31,178	85,663	288,278
(k) Lights for night work	.....	3,239	400	1,000	4,639
(l) Mistakes and poorwork removed	12,000	.....	28,000	85,663	125,663
(m) City and government inspection and permits	414,848	.....	400	4,000	419,248
(n) Store yard rental and wages	127,645	43,490	.....	102,795	273,930
(o) Cost record office	41,798	2,257	15,955	17,132	77,142
(p) Drying out and testing machinery	.....	17,640	23,000	1,250	41,890
(q) Wear and tear during construction	.....	Neg.	.....	Neg.	.....
(r) Payroll insurance	208,994	3,699	5,000	85,663	303,356
(s) Fire insurance	.....	1,045	4,037	8,566	13,648
(t) Sub-contractor's bonds	104,497	32,033	39,887	42,831	219,248
(u) Fidelity bonds	1,440	Neg.	Neg.	Neg.	1,440
(v) Paymasters' wages and expense	95,600	2,299	Neg.	37,692	135,591
(w) Supervision, power, watching, cleaning, etc	.....	39,872	Neg.	171,326	211,198
(x) Telegraph, telephone, traveling, stationery, etc	40,000	11,280	2,600	34,265	88,145
Totol incidentals	$ 1,567,835	$ 256,279	$ 960,389	$1,116,521	$ 3,901,024
Total cost	20,005,945	7,845,884[1]	7,779,908	8,766,509	44,398,246[2]
Per cent. incidentals	7.8%	3.3%	12.3%	12.7%	8.8%[2]

[1] Electric cars and equipment only. No allowance made for incidentals on horse cars.

[2] Does not include horse cars fixed tools and appliances and 4th Ave. Tunnel for which no allowances for incidentals have been made.

EXHIBIT NO. 19

METROPOLITAN REORGANIZATION CASE No. 1305

FORD, BACON AND DAVIS, ENGINEERS

PUBLIC SERVICE COMMISSION—FIRST DISTRICT

DEPRECIATION AND PRESENT VALUE

Item	Cost new	Salvage value	Wearing value	Life, years	Age, years to January 1, 1910	5 per cent. sinking fund depreciation to October 1, 1910	Present value, October 1, 1910
Track—Electric							
Removal of obstructions including paving.	$ 3,209,922	$3,209,922	Nothing	Inf.	.....	.....	$ 3,209,922
Foundation and excavation	7,282,117	419,042	$6,863,075	50	11.4	$ 528,457	6,753,660
Paving in track	2,081,193	Nothing	2,081,193	14	7.4	1,030,191	1,051,002
Tram rail in straight track	1,540,633	276,347	1,264,286	14	7.9	673,864	866,769
Slot rail	545,785	145,845	399,940	25	11.0	129,181	416,604
Conductor lines	483,607	53,888	429,719	10	4.1	180,482	303,125
Special work and paving	1,159,594	128,000	1,031,594	5	1.6	467,312	692,282
	16,302,851						
Horse track and special work	1,317,657	71,246	1,246,411	25	8.0	276,703	1,040,954
Ducts	2,344,023	Nothing	2,344,023	50	11.4	180,490	2,163,533
Cables	3,534,468	1,005,035	2,519,433	33 1/3	9.3	387,993	3,136,475
Power plant and sub-station	4,256,939	851,400	3,405,539	25	6.3	582,347	3,674,592
Buildings	8,157,900	Nothing	8,157,900	50	7.4	375,263	7,782,637
Equipment of buildings	608,609	121,722	486,887	33	7.4[1]	57,940	550,669
Rolling stock, electric	8,148,019	315,700	7,832,319	30	7.9	1,229,643	6,918,376
Rolling stock, horse	710,399	5,505	704,894	33 1/3	29.6	583,652	126,747
Fixed tools and appliances	221,013	44,202	176,811	20	4.0	27,583	193,430
4th Ave. Tunnel	466,356	Nothing	466,356	Inf.	.....	.....	466,356
Incidentals	3,901,024	Nothing	3,901,024	33 1/3	8.5	542,242	3,358,782
General contractor	4,995,926	Nothing	4,995,926	Inf.	.....	.....	4,995,926
Engineering	2,747,759	Nothing	2,747,759	Inf.	.....	.....	2,747,759
Interest and taxes	7,333,723	Nothing	7,333,723	Inf.	.....	.....	7,333,723
Stores and supplies	1,518,512	Nothing	1,518,512	Inf.	.....	.....	1,518,512
Office furniture, etc	170,953	Nothing	170,953	20	5[1]	33,165	137,788
Floating tools	131,886	Nothing	131,886	15	5[1]	39,170	92,716
Incidentals	15,142	Nothing	15,142	18	5[1]	3,452	11,690
Add renewals 1/1/10 to 10/1/10	.....	.....	.....	.....	.....	.....	563,944
Total construction	$66,873,159	.....	$60,225,305	.....	.....	$7,329,130	$60,107,973
Permanent organisation	732,250	.....	.....	.....	.....	.....	732,250
Franchise sec. deposit	740,000	.....	.....	.....	.....	.....	740,000
Real estate	13,808,987	.....	.....	.....	.....	.....	13,808,987
Working capital	1,182,434	.....	.....	.....	.....	.....	1,182,434
	$83,336,830						$76,571,644

[1] Assumed.

EXHIBIT NO. 12 (PAGE 14)

METROPOLITAN REORGANIZATION

CASE NO. 1305

FORD, BACON AND DAVIS, ENGINEERS

STANDARD ELECTRIC TRACK CONSTRUCTION

ESTIMATE NO. 1—60'

	Number per mile	Unit price	Cost per mile
Tram rail, No. 115–279, 60' 0" lg.	176	$38.40 per gross ton	$6,939.26
Drilling for tie rods	4,400	0.025 each	110.00
Slot rail, No. 58–227, 30' 0" lg.	352	$39.40 per gross ton	3,591.03
Continuous rail joint	176	6.00 per joint	1,062.00
Slot rail splice and bolts	352	0.52 per splice	183.04
Conductor rail, No. 21, 30' 0" lg.	352	51.52 per gross ton	1,700.16
Conductor bond	704	0.3345 each	235.49
Insulator and bracket	.....	.....	1,093.31
Bolts, washers, shims, liners, etc.	.....	.....	805.44
Tie rods	.....	.....	913.22
Yokes, curbs, covers, etc	.....	.....	13,914.98
Roof plates, etc	.....	.....	1,068.23
Conduit plates	.....	.....	1,072.08
Extra stock losses, etc	.....	.....	581.00
Misc. materials, drain pipe, brick, lumber, etc.		.....	3,401.20
Track blocks	60,720		
Specification blocks	.....	.....	
Concrete cubic yard	.....	.....	8,750.20
Track laying	.....	.....	11,932.80
Hauling	.....	.....	943.75
Miscellaneous labor	.....	.....	954.62
			$59,251.81

EXHIBIT NO. 12 (PAGE 33)

ELECTRIC TRACK

UNIT COST FOR EXCAVATION

	Cost per ft. single track
Excavating	$1.65
Taking up old paving	.13
Loading dirt excavated	.15
Hauling dirt excavated	.27
Dump charges	.35
Excavation for drainage	.21
Miscellaneous labor	.22
Oil for lighting	.02
	$3.00

EXHIBIT NO. 12 (PAGE 60)

HORSE CAR TRACK

UNIT COSTS, ESTIMATED

	Cost per ft. single track
A. 9″ GIRDER TRACK.	
9″ No. 107 rail @ $40 per ton	$1.27
Ties y. p. 3′ center to center @ $ .50 each	.17
Spikes	.05
Joints	.26
Hauling and distributing material	.25
Dump charges, tools, blacksmith, kerosene oil, etc	.17
Labor	.70
Total cost track	$2.87
Paving, 1 sq. yd. per ft. S. T	3.50
Total cost track and paving	$6.37
B. 7″ GIRDER TRACK.	
7″ No. 91 rail @ $40 per ton	$1.08
Ties, y. p. 3′ center to center @ $ .50 each	.17
Spikes	.05
Joints	.21
Hauling and distributing material	.24
Dump charges, tools, blacksmith, kerosene oil, etc	.17
Labor	.68
Total cost track	$2.60
Paving, 1 sq. yd. per ft. S. T	3.50
Total cost track and paving	$6.10
C. STRINGER TRACK.	
Rail and fastenings, No. 45 @ 1 1/2¢ per pound	$ .45
Ties, y. p. 2 1/2′ center to center	.22
Stringers, 5″ x 7″ 8¢ per ft	.16
Knees and spikes, 5¢ each complete	.08
Labor	.70
Total cost track	$1.61
Paving, 1 sq. yd. per ft. S. T	3.50
Total cost track and paving	$5.11

EXHIBIT NO. 12 (PAGE 114)

ELECTRIC TRACK

REMOVAL OF OBSTRUCTIONS, UNIT COST

The records of the Metropolitan Street Railway Company, as contained in cost sheets, in general show in connection with the removal of obstructions, only bills from the owners of obstructions, such as gas, electric, telephone and subway companies, the city water department, etc., and do not show separately all expense incurred by the company on account of such work. The following is an estimate of total costs:

Actual charges per foot in Construction Cost Record	$1.36
Add for Company Labor and Material not separated from other Track Costs	1.30
Add for increase in Wage Rates 1900 to 1910	.24
Add for City Inspectors	.12
Total Cost per Foot	$3.02
Use $3.00	

EXHIBIT NO. 12 (PAGE 117)

DUCTS LAID WITH TRACK

UNIT COST

The following unit cost is based on the costs for the Kingsbridge Road, where for 33,320 feet single track length there were 591,000 duct feet, or about 18 duct feet per foot of single track.

	Cost per duct foot
Labor per Company's records	$.0733
Add for increase in labor rates 1900 to 1910, 20 per cent	.0146
Material	.08
Removing paving and re-paving 1/4 cubic yard per foot single track at $5 per square yard $\frac{\$5.00}{4x18}$	.0694
Obstruction, in addition to track, 1/7 of that for track, $3 per foot single track, $\frac{\$3.00}{7x18}$	.0238
Total cost per duct foot	$.2613
Use $0.26	

Coney Island & Brooklyn Railroad Company.—In 1909 a citizen applied to the Public Service Commission of New York, First District, for a reduction in the rate of fare, 10 cents, charged by the Coney Island and Brooklyn Company, a solvent and operating corporation, between Brooklyn and Coney Island. At the time, Mr. B. J. Arnold, Consulting Engineer of Chicago, was in charge of the valuation bureau and consultant for the Commission, which directed him to make an appraisal of the Railroad Company's property with a view to determining the proper rate. The applicant's petition was finally denied by the Commission, the finding being based on the value of the property as determined by the Commission's engineer.

Exhibit No. 9, page 1, gives Mr. Arnold's valuation of the physical property, the figures shown including an allowance of 10 per cent. for general contractor, except those values relating to "Miscellaneous Stock, Fixtures, etc.," and "Real Estate." In addition 15 per cent. was added to cover "Engineering, Incidentals, and Organization" in making up the cost of reproduction of the physical property. In Mr. Arnold's testimony evidence was given as to the additional investment necessary to cover "Development Expenses" which, including something more than items ordinarily covered by that term, from the values in this case, would run from a little over 30 per cent. to possibly over 50 per cent. of the value of the physical property as given.

As exemplifying Mr. Arnold's detail work, unit prices for this particular valuation, and general methods, pages 6, 20, 65 and 77 1/2 from Exhibit No. 9 are here reproduced.

Exhibit No. 10, page 1, is a summary of Mr. Arnold's estimate of depreciation and resulting present value of the Coney Island and Brooklyn property. Pages 5, 9, 10 of the same Exhibit are given to show the method adopted in determining the various classes of depreciation.

EXHIBIT NO. 9 (PAGE 1)

PUBLIC SERVICE COMMISSION, FIRST DISTRICT

B. J. ARNOLD, CONSULTING ENGINEER

CONEY ISLAND & BROOKLYN RAILROAD. CASE NO. 1134

TANGIBLE VALUE AS OF FEB. 1, 1909

Track	$ 729,852.80
Track Special Work	241,882.30
Paving	421,474.73
Overhead Trolley Construction	145,965.63
Overhead Feeders	110,632.25
Underground Conduits and Cables	336,324.49
Power Plants and Sub-stations	733,393.07
Buildings	579,963.80
Rolling Stock	1,383,461.50
Total	$4,682,970.60
Add Incidentals, 5 per cent; Organization, 5 per cent.; Engineering, 5 per cent.; Total, 15 per cent	702,445.59
	$5,385,416.19
Miscellaneous Stock, Fixtures, etc	103,679.77
Real Estate, Assessed Value	187,800.00
Grand Total	$5,676,895.96

EXHIBIT NO. 9 (PAGE 6)

CONEY ISLAND & BROOKLYN RAILROAD

COST TO REPRODUCE

ESTIMATE NO. 1

COST TO CONSTRUCT ONE MILE OF SINGLE TRACK

Excavation 2787 cu. yds	at	$1.30	$ 3,623.10
Ties, 2′ 0″ c.c. 2640	"	.70	1,848.00
Rail, L. S., 90 lb., 206–60′ lengths, 141.4 tons	"	39.00	5,514.60
Rail Joints, 176	"	3.30	528.00
Tie Rods, 880	"	.30	264.00
Spikes, 31 kegs	"	4.00	124.00
Double Bonds, labor included, 176	"	1.50	264.00
Concrete, 669 cu. yds	"	6.00	4,014.00
Track Laying, 5280 ft	"	.32	1,689.60
Hauling, 160 tons	"	2.00	320.00
Extra Stock and losses			200.00
Total cost per mile			$18,389.30
Total cost per foot			3.48

EXHIBIT NO. 9 (PAGE 20)

CONEY ISLAND & BROOKLYN RAILROAD

COST TO REPRODUCE

90 LB. S. B. GIRDER 60′ RAIL LAID ON TIES 2′ 6″ C.C.

On a Mile Basis

90 lb. Section 90, No. 206 Girder Rail, 60′ lengths, 141.4 tons	at	$39.00	$5,514.60
Fish plates and Bolts, 176, per joint	at	1.25	220.00
Ties 8″ x 6″ x 8′ 0″—2112	at	.70	1,478.40
Double Bonds and labor, 176	at	1.50	264.00
Spikes, 21 kegs	at	4.00	84.00
Track laying, 5280 ft	at	.15	792.00
Hauling, 150 tons	at	1.00	150.00
Extra stock and losses			150.00
Cost per mile			$8,653.00
Cost per foot			1.64

90 LB. S. B. GIRDER 30′ RAIL LAID ON TIES 2′ 6″ C.C.

On a Mile Basis

90 lb. Section No. 206 Girder Rail, 30′ lengths, 141.4 tons	at	$37.00	$5,231.80
Fish Plates and Bolts, 352, per joint	at	1.25	440.00
Ties 6″ x 8″ x 8′ 0″—2112	at	.70	1,478.40
Double Bonds and Labor, 352	at	1.50	528.00
Spikes, 21 kegs	at	4.00	84.00
Track laying, 5280 ft	at	.15	792.00
Hauling, 150 tons	at	1.00	150.00
Extra stock and losses			150.00
Cost per mile			$8,854.20
Cost per foot			1.68

60 LB. T RAIL LAID ON TIES 2′ 6″ C.C. NO BONDS USED.

60 lb. A. S. C. E., T. Rail 30′ lengths, 94.3 tons	at	$30.00	$2,829.00
Fish Plates and Bolts, 352	at	1.25	440.00
Ties 6″ x 8″ x 8′ 0″—2112	at	.70	1,478.40
Spikes, 21 kegs	at	4.00	84.00
Track laying (no bonds or ballast), 5280	at	.10	528.00
Hauling, 100 tons	at	1.00	100.00
Extra stock and losses			150.00
Cost per mile			$5,609.40
Cost per foot			1.06

40 LB. T. RAIL LAID ON TIES 2′ 6″ C.C. NO BONDS USED.

40 lb. A. S. C. E., T Rail 30′ lengths, 62.9 tons	at	$30.00	$1,887.00
All other items—same as for 60 lb. rail			2,780.40
Cost per mile			$4,667.40
Cost per foot			.88

EXHIBIT NO. 9 (PAGE 65)

CONEY ISLAND & BROOKLYN RAILROAD

REPRODUCTION VALUE

SMITH STREET POWER PLANT (NEW)

MECHANICAL EQUIPMENT

Item No. 1.—Six (6) 604 H. P. Babcock & Wilcox water tube boilers, equipped with superheaters to raise the temperature of the steam 110 degrees F. above the temperature of saturated steam at 200 lbs. pressure. Each boiler is equipped with 150 sq. ft. of Neems shaking and dumping grates.....		$59,260.00
Item No. 2.—Steel stack with concrete pile foundation. Brick and reinforced concrete smoke flue. Steel stack 200 ft. high 12′ 10″ inside diameter. Fire brick lining.....		24,339.18
Item No. 3.—One 30-ton hand-power crane erected in place....		2,478.22
Item No. 4.—Coal and ash handling, steel ash hopper, steel coal and ash cars, track and electric locomotives.		
Expended to date.....	$2,531.10	
3 ash cars at $90.....	270.00	
2 electric coal cars at $1000	2,000.00	
Electrical material and labor.....	1,100.00	
Rails, spikes, plates and labor for track installation.....	300.00	
Labor and material for building coal bin and trestle.....	5,000.00	
Incidentals.....	598.00	
Total.....		11,799.10
Item No. 5.—Forced draft equipment: Two (2) Sturtevant blowers and engines 3/16″ steel duct for forced draft. No. 13 iron duct for cooling generators.		
Contract price for ducts.....	$1,700.00	
Contract price for ducts, blowers and engines.....	1,000.00	
"Extras".....	452.58	
Total to date.....		3,152.58
Estimated cost installing No. 2 blower and engine.....	200.00	
Estimated extras to complete job.	200.00	
		400.00

EXHIBIT NO. 9 (PAGE 77 1/2)

CONEY ISLAND & BROOKLYN R. R. CO.

APPRAISAL OF ROLLING STOCK AND EQUIPMENT
REVENUE CAR BODIES

No. of cars in group		Builder	Date overhauled	Age years	Unit price new	Total cost to reproduce
Open	Closed					
	10	J. G. Brill...	.....	13	$1430	$14,300
10	.....	J. G. Brill...	.....	12	1430	14,300
	10	J. G. Brill...	.....	12	1400	14,000
75	.....	J. G. Brill...	.....	11	1270	95,250
	36	J. G. Brill...	.....	11	1400	50,400
	4	J. G. Brill...	1908	11	1400	5,600
73	.....	J. G. Brill...	.....	10	1305	95,265
2	.....	J. G. Brill...	1908	10	1305	2,610
	40	J. G. Brill...	.....	10	1400	56,000
	10	J. G. Brill...	1908	10	1400	14,000
50	.....	J. G. Brill...	.....	9	1305	65,250
	11	J. G. Brill...	1908	9	1284	14,124
	8	J. G. Brill...	.....	9	1284	10,272
	18	J. G. Brill...	1908	6	1900	34,200
	7	J. G. Brill...	.....	6	1900	13,300
50	.....	J. G. Brill...	.....	5	1480	74,000
	24	Kuhlman....	1908	5	1750	42,000
	1	Kuhlman....	.....	5	1750	1,750
	10	J. G. Brill...	.....	4	2064	20,640
	10	J. G. Brill...	.....	1	2100	21,000
260	199					$658,261

EXHIBIT NO. 10

CONEY ISLAND & BROOKLYN RAILROAD

CASE NO. 1134

PUBLIC SERVICE COMMISSION, B. J. ARNOLD, CONSULTING ENGINEER

DEPRECIATION AND PRESENT VALUE

AS OF FEBRUARY 1, 1909

RECAPITULATION

	Depreciation			Total depreciation	Present value
	Due to obsolescence, inadequacy and age	Due to normal wear	Due to deferred maintenance		
Track	77,570.07	233,922.90	57,379.92	368,872.89	470,457.83
Special work and cross bonding	0.00	101,531.89	28,304.21	129,836.10	148,328.54
Paving	24,608.76	167,243.63	34,504.38	226,356.77	258,339.17
Overhead trolley	0.00	46,224.40	0.00	46,224.40	121,636.07
Overhead feeders	26,044.33	3,068.18	0.00	29,112.51	98,114.57
Underground conduit and Cables	0.00	15,419.02	0.00	15,419.02	371,354.13
Power plant:					
Old mechanical	98,119.80	4,250.00	5,750.00	108,119.80	55,952.47
Old electrical	51,904.03	1,050.00	700.00	53,654.03	43,835.73
New mechanical	0.00	0.00	800.00	800.00	254,657.35
New electrical	0.00	0.00	0.00	0.00	233,297.63
Sub-stations:					
De Kalb Ave.	0.00	0.00	0.00	.....	58,601.13
Kings Highway	0.00	0.00	0.00	.....	34,483.90
Buildings	201,524.73	9,349.00	1,402.00	212,275.73	539,460.69
Rolling stock	552,111.80	114,921.74	42,065.24	709,098.78	881,881.95
	$1,031,883.52	$696,980.76	$170,905.77	$1,899,770.03	$3,570,401.16

Miscellaneous stock, fixtures, etc., no depreciation	103,679.77
Real Estate, assessed value	187,800.00
Total present value of physical property	$3,861,880.93

To this total should be added the allowance for development expenses and working capital to get Total Present Value

EXHIBIT NO. 10 (PAGE 5)

CONEY ISLAND & BROOKLYN RAILROAD

PRESENT VALUE AS OF FEBRUARY, 1, 1909

PAVING

(*a*)	Cost to Reproduce	$421,474.73	
	Add 15 per cent. for Incidentals Administration & Engineering	63,221.21	
	Total Cost		$484,695.94
(*b*)	Scrap Value:		
	1460.90 sq. yds. granite at 10¢	$14,609	14,609 00
	Asphalt o, Cobble o:		
(*c*)	Service Value (*a*)–(*b*)		470,086.94
(*d*)	Obsolescence:		
	No obsolescence on Granite & Asphalt paving		
	Total Cost Cobble Pavement:		
	29928.6 sq. yds. at 65¢	$19,453.58	
	Add 10 per cent. Profit	1,945.35	
		21,398.93	
	Add 15 per cent	3,209.83	
	Total Obsolescence		24,608.76
(*e*)	Normal Wear	$383,158.85	
	Cost to Replace Entire Pavement		
	Less Cost of Cobble	19,453.58	
		363,705.27	
	Less Salvage		
	2 X Scrap	29,218	
	1/2 of	$334,487.27	$167,243.63
(*f*)	Deferred Maintenance:		
	By Inspection		$ 34,504.38
(*g*)	Remaining Service Value		243,730.17
(*h*)	Present Value		$258,339.17

EXHIBIT NO. 10 (PAGE 9)

CONEY ISLAND & BROOKLYN RAILROAD

PRESENT VALUE AS OF FEBRUARY 1, 1909

UNDERGROUND CONDUITS AND CABLES

(*a*) COST TO REPRODUCE	$336,324.49	
Add 15 per cent. for Incidentals, Administration and Engineering	50,448.66	
		$386,773.15

(*b*) SCRAP VALUE:

Material allowed at following prices:

Copper, 11¢ lb. Lead, 3 3/4¢ lb.

Triple Braid Weatherproof,

500,000 c. m., 1.57 lbs., copper	17.3¢	per foot
No. 0000, 0.66 lbs., copper	7.3¢	per foot

600 volts paper insulated 1/8″ lead covered

1,000,000 C. M. 3.14 lbs., copper	34.6¢	
3.2 lbs., lead	12.1¢	
Total	46.7¢	per foot
500,000 C. M., 1.57 lbs., copper	17.3¢	
1.89 lbs., lead	7.1¢	
Total	24.4¢	per foot

BARE STRANDED CABLES.

500,000 c. m., 1.57 lbs	17.3¢	per foot

THREE CONDUCTOR 11,000 VOLT CABLE.

No. 000, 1.59 lbs., Copper	17.4¢	
3.46 lbs. Lead	13.0¢	
Total	30.4¢	per foot
No. 2, 0.63 lbs., Copper	6.9¢	
2.9 lbs., lead	10.9¢	
Total	17.8¢	per foot

11,000 Volt, 3 Conductor Cables, Scrap Value:

Line No. 1—34,760″—No. 000 Cable at 30.4¢	$10,567.04	
Line No. 2—57,792″—No. 2 Cable at 17.8¢	10,286.98	
Gowanus Canal, 370″ No. 2 Cable at 17.8¢	65.86	
Rockwell Sta., 350″ No. 000 Cable at 30.4¢	106.40	
		$21,026.28

EXHIBIT NO. 10 (PAGE 10)

600 Volt Cable, Scrap Value:		
1,000,000 c. m. 44,587″ at 46.7¢.....	$20,822.13	
500,000 c. m. 9,680″ at 24.4¢.....	2,361.92	
1,000,000 c. m. 740″ at 46.7¢.....	345.58	
		$23,529.63
Bare Cable, Scrap Value:		
500,000 c. m. 12,200″ at 17.3¢.....	2,110.60	2,110.60
Scrap Value all cables.....		$46,666.51
(*c*) Service Value (*a*)–(*b*).....		340,106.64

(*d*) Obsolence, Inadequacy and Age:
As the conduit and cable system are modern, no obsolescence has been considered.

(*e*) NORMAL WEAR:
All high tension cables are new with the exception of one feeder (No. 18); practically all direct current feeder cables were installed in 1904 and have been in place 5 years.
Owing to electrolysis the probable average life of these cables will not be over 10 years, therefore, 1/2 of the cost of a complete maintenance will equal the deduction to be made for normal wear to date.
To insulate and relead a 1,000,000 cable costs 31¢, freight allowed one way. To pull out, ship and pull in this cable would cost 21¢, making cost of maintenance 52¢, which is equal to 50 per cent. of the first cost.
To reinsulate and relead a 500,000 c. m. cable cost 19.4¢ per foot and allowing 12¢ for labor and freight one way brings cost of complete maintenance to 31.4¢, about 50 per cent. of first cost.
The measure of normal wear, therefore, is 1/2 of 50 per cent. of first cost, or 25 per cent. of $61,676.08 = $15,419.02.

(*f*) Deferred maintenance nominal.

(*g*) Remaining Service Value.....	$324,687.62
(*h*) Present Value.....	$371,354.13

Kings County Lighting Company.—The Kings County Lighting Company was supplying gas at $1.00 per thousand, in the thirtieth ward of Brooklyn, when in September, 1910, a petition was presented to the Public Service Commission to reduce the rate. The Company had been gradually reducing rates from $2.00 in 1894 until the $1.00 rate was reached in 1901. As the result of an investigation, based on an examination and valuation made by its own engineers as well as from a consideration of the testimony and appraisals offered by the Companies'

representatives and experts, the Public Service Commission fixed the rate at 85 cents per thousand feet for gas supplied from November 1, 1911 to December 31, 1912, and 80 cents for the year 1913.

The value of the total property of the Company, as of December 31, 1910, was found by the Commission to be as follows:

Net cost of tangible property other than land, etc.	$1,561,628
Contractor's profit, engineering admin. contg. and incidentals.	341,149
Cost to reproduce new	$1,902,777
Depreciation	415,198
	$1,487,579
Land—present value	650,000
Present value of plant, etc.	$2,137,579
Preliminary and development	260,000
Working capital	80,000
Total	$2,477,579

On the following pages, Exhibits No. 17 and 18, introduced by the Commission's Engineer, are shown the appraised values of the property including all paving over mains and services regardless of whether the paving was put down before or after the pipes. In its opinion and decision, the Commission excluded the value of paving laid after the installation of mains and services on the ground that

"the Company is not entitled to charge a rate sufficient to pay dividends upon property which it does not own, which it has not constructed, and for which no expenditures have been incurred by the Company either directly or indirectly,"

despite the fact that the Commission was considering figures made to show the cost of reproduction. Furthermore, the Commission modified and increased certain unit prices of its engineer on the ground that the evidence introduced showed the prices used by him were too low,

"adequate allowance not having been made for various expenses connected with the construction of mains and services,"

it also increased real estate values by $400,000 so that the

exhibits here reproduced differ in these items from the total amounts given in the printed opinion.

The experts for the Company, Messrs. William A. Baehr of Chicago, and William W. Randolph of New York, made separate valuations of the Company's property.

Mr. Baehr's total value, on the basis of reproduction cost, was $4,252,543, including $781,916 for going value which was estimated along lines described by Messrs. Metcalf & Alvord, as explained in Chapter VII. The itemized valuation offered in evidence by Mr. Baehr is too voluminous for reproduction herein, but his unit prices and the method of developing them are sufficiently interesting and instructive to give in full, Exhibit No. 29.

Mr. Randolph's value for the total property was $4,335,222, including $600,000 for going value, the items being set forth in the following Exhibits A, B, C and D.

As shown by its Engineer's exhibit, and as set forth in its opinion, the Commission allowed the usual percentage of 10 per cent. for contractor's profit and 15 per cent. for engineering, etc., amounting, in the revised figures, to an average of 21.8 per cent. added to the total net cost.

Present value was estimated by deducting only theoretical depreciation from the cost of reproduction on the following basis:

"In determining the present value of the property, an examination of its physical condition was made to determine what if any deferred maintenance existed. This examination showed that the property was in excellent repair and that no deductions from the value of the property should be made in order to allow for the property not being in an efficient operating condition. The depreciation as determined is therefore based on the age of the various component elements. At the time this inventory of the property was made, the age of each article or element was ascertained. The probable life of each element was then determined by a consideration of the existing conditions under which it is used and a study of statistics of the life of similar apparatus. From this estimated life an annual depreciation was determined on a straight line basis, that is, a uniform depreciation per year. The total depreciation to date of each part was then computed and deducted from the cost to reproduce, leaving the present value."

In making up the total fair value of the property on which the Company was entitled to earnings, the Commission including

nothing for going value "beyond what has already been conceded should be made in determining the fair rate of return," but after obtaining the depreciated or "present value" of the plant added $260,000, over 12 per cent., for "preliminary and development expenses" and $80,000, nearly 4 per cent., for working capital, making an aggregate of almost exactly 16 per cent. for "development expenses" added to the total value of the physical property, of which 30 per cent. was real estate. The Company refused to comply with the ruling of the Commission, reducing its rates, and is now contesting the order in the courts.

EXHIBIT NO. 17

CASE NO. 1273

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Determination of Cost to Reproduce. Public Service Commission, First District

20

Account	No.	Net cost	10 per cent. for contractors' profit	Contract cost	15 per cent. for eng., admin. and incidentals	Cost to reproduce
General structures	G-121	$ 18,620.00	$ 1,862.00	$ 20,482.00	$ 3,072.00	$ 23,554.00
Furnaces, boilers and accessories	G-141a	22,928.00	2,293.00	25,221.00	3,783.00	29,004.00
Water gas sets and accessories	G-143a	74,866.00	7,487.00	82,353.00	12,353.00	94,706.00
Misc. power plant equipment	G-145	1,855.00	186.00	2,041.00	306.00	2,347.00
Works and station structures	221	183,147.00	18,315.00	201,462.00	30,219.00	231,681.00
Holders	222	232,432.00	23,243.00	255,675.00	38,352.00	294,027.00
Purification apparatus	224	25,148.00	2,515.00	27,663.00	4,149.00	31,812.00
Accessory equipment at works	225	64,186.00	6,419.00	70,605.00	10,591.00	81,196.00
Trunk lines and mains	231	647,592.00	64,759.00	712,351.00	106,853.00	819,204.00
Gas services	232	166,151.00	.....	166,151.00	.....	166,151.00
Gas meters	233	127,429.00	.....	127,429.00	.....	127,429.00
Gas meter installation	234	24,539.00	.....	24,539.00	.....	24,539.00
Municipal gas lighting fixtures	235	31,892.00	.....	31,892.00	.....	31,892.00
Gas engines and appliances	236	1,074.00	107.00	1,181.00	177.00	1,358.00
Gas tools and implements	237	161.00	.....	161.00	.....	161.00
Gas laboratory equipment	238	1,454.00	.....	1,454.00	.....	1,454.00
Sub-total, construction accts	.....	$1,623,474.00	$127,186.00	$1,750,660.00	$209,855.00	$1,960,515.00
Land devoted to gas operations	G-110	251,281.00	.....	251,281.00	.....	251,281.00
General equipment	G-122	12,036.00	.....	12,036.00	.....	12,036.00
Sub-total, non-construction accts	.....	$ 263,317.00	.....	$ 263,317.00	.....	$263,317.00
Total, fixed capital accounts	.....	$1,886,791.00	$127,186.00	$2,013,977.00	$209,855.00	$2,223,832.00
Floating capital and operating assets	.....	53,885.00	.....	53,885.00	.....	53,885.00
Total, operating property	.....	$1,940,676.00	$127,186.00	$2,067,862.00	$209,885.00	$2,277,717.00

EXHIBIT NO. 17

CASE NO. 1275

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Net Cost

Boilers, Furnaces and Accessories

	Acct. G-141a
1 B. & W. 215 H. P. boiler	$ 3,041.80
2 B. & W. 106 H. P. boiler	3,050.73
2 B. & W. 106 H. P. boiler	3,426.73
2 Worthington feed water pumps	250.26
1 Oil tank	3.50
1 Water barrel	1.00
1 Steel stack	831.88
1 Steel stack	812.00
1 Steel stack	840.00
1 Berryman feed water heater	392.50
Coal handling machinery—misc	475.68
3 Coal cars	450.00
Coal conveying machinery	320.72
Wooden split pulley	15.00
Solid iron pulley	6.00
Rubber comp. belting	20.00
Coal handling machinery, track, etc	1,757.50
1–3 Ton Howe Ry. platform scale	242.00
Coal hopper	101.59
1 Single vertical engine	240.00
Coal hopper with screen	125.00
1 Mast and Gaff	865.81
1 Clam-shell bucket	400.00
1 Rawson & Morrison Mfg. Co. hoist	750.00
Levers, etc., hoisting engine	16.98
1 75 H. P. vertical boiler	824.50
1 50 H. P. vertical boiler	597.90
1 100 H. P. Mason horizontal boiler	1,905.54
1 Cameron feed water pump	230.00
1 Turbo blower std. damper regulator	69.00
25-ft. 1½-in. Steam rubber hose	21.88
10-ft. 1-in. Steel jointed wire covered steam hose	11.20
20-ft. 1¼-in. wire bound steam hose	23.20
1 Wooden ladder, 12 ft	2.76
2 Iron wheelbarrows	10.00
2 Water pails	.60
Rack for irons	4.30
4 12-ft. Hose	10.00
4 12-ft. Slice bars	7.00
4 Scoop shovels	3.44
1 Stack 5 ft. dis., 125 ft. high	750.00
Net cost acct. G–141a	$22,928.00

EXHIBIT NO. 17

CASE 1273

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Net Cost

Water Gas Sets and Accessories

	Acct. G-143a
1 12-ft. Williamson vertical single unit generator	$24,012.97
1 8-ft. Lowe generating set	8,959.21
2 8-ft. Lowe generating sets	19,077.91
2 Condensers	4,752.08
2 Condensers	5,411.08
2 Berryman oil heaters	500.00
2 90 H. P. high speed center crank automatic engines	4,579.63
2 No. 11 Blowers	956.12
180 ft. leather belting	234.00
Miscellaneous gauges, etc	58.53
1 2-ton hydraulic elevator	840.00
Blast piping	1,072.41
4 Charging cars	588.00
1 90 H. P. Terry turbine blower	2,790.25
1 Coal spout	2.25
1 2-ton elevator	925.00
2 Coal buggies	120.00
1 Coal car	50.00
1 Coal yoke	10.24
1 Wheelbarrow	5.00
Miscellaneous gen. tools	121.58
Net cost, acct. G-143a	$74,866.26
Taken as	$74,866.00

EXHIBIT NO. 17

CASE 1273

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Net Cost

Holders

	Acct. 222
1 2,000,000 cu. ft. holder	$148,570.95
1 500,000 cu. ft. holder	51,244.60
1 107,000 cu. ft. holder	17,045.46
1 100,000 cu. ft. holder	15,571.05
Net cost, acct. 222	$232,432.06
Taken as	$232,432.00

EXHIBIT NO. 17

CASE 1273

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Net Cost

Accessory Equipment at Works

Group "A"

	Acct. 225
1 No. 10 Root's exhauster	$ 2,949.09
Foundation, washer scrubber	830.53
1 No. 8 Root's exhauster	1,771.22
2 No. 6 Root's exhausters	2,172.61
1 Paint spraying machine	30.00
1 Oil separator	50.00
1 5-gal. sheet-iron oil-can	.75
1 No. 1 Pitcher pump	3.00
2 60-gal. oil tanks	11.50
1 Oil pump	107.34
1 Oil compression tank	22.73
1 5-gal. sheet-iron oil-can	.75
1 Drip line pump	93.54
1 Drip line pump	118.54
1 Pressure oil tank	9.23
1 Tar circulating water pump	305.89
2 Water pails	.60
1 Grindstone	5.00
1 Tar circulating water pump	183.39
1 Oil filter	16.90
3 60-gal. oil tanks	15.00
1 Oil pump	625.00
1 12-ft. station meter	5,318.73
1 Wyley proportional station meter	250.75
1 Wagon scales	329.79
1 Water meter	80.00
1 Low pressure regulator	18.00
1 Tar settling tank	2,414.03
1 20,000-gal. water tank	487.96
2 3500-gal. tar tanks	362.10
400 ft. 1-in d. Manilla rope	10.00
60 ft. 3/4-in. wire wound hose	3.06
25 ft. 5/16-in. chain	1.00
200 ft. 3/8-in. wire rope	8.00
100 ft. fire hose	25.00
1 Pipe truck	11.20
1 Oil tank	13.50
3 24-in. Manometer gauges	39.15
1 Tar pump	186.20
1 Tar pump	186.20
1 Water pump	247.85
1 Simple engine, vertical	150.00
33 ft. 5-in. leather belt	23.76
1 Blower	49.00
Forward	$19,537.89

EXHIBIT NO. 17

CASE NO. 1273

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Net Cost

Trunk Lines and Mains

Mains		Unit Price		Acct. No. 231
264 ft.	1¼ in....	at $ .1839	$ 48.55	
3,706 ft.	1½ in ...	at .2024	750.09	
2,937 ft.	2 in....	at .2246	659.65	
13,011 ft.	3 in....	at .3150	4,098.47	
359,146 ft.	4 in....	at .4150	149,045.59	
365,208 ft.	6 in....	at .600	219,124.80	
42 ft. W.I.	6 in....	at .748	31.42	
19,108 ft.	8 in....	at .876	16,738.61	
111 ft. W.I.	8 in....	at 1.176	130.43	
48,668 ft.	12 in....	at 1.352	65,799.14	
70 ft. W.I.	10 in ...	at 1.666	116.62	
6,966 ft.	16 in ...	at 2.040	14,210.64	
9,377 ft.	20 in....	at 2.796	26,218.09	
61 ft.	24 in....	at 3.694	225.33	
				$497,197.43
Fittings:				
Crosses		at $.027 per lb.	$4,855.92	
Tees		at .027 per lb.	1,347.36	
Elbows		at .027 per lb.	438.09	
Reducers and increasers		at .027 per lb.	903.57	
Caps and plugs		at .027 per lb.	718.92	
Sleeves		at .027 per lb.	24.44	
				$8,288.30
Pavement:				
Asphalt, 30,325.51 sq. yd		at $3.00	$ 90,976.53	
Asphalt block, 2,727.05 sq. yd		at 3.50	9,544.67	
Belgian block, 5,524.56 sq. yd		at .50	2,762.28	
Brick, 1,441.58 sq. yd		at 2.50	3,603.95	
Granite, 1,444.98 sq. yd		at .50	722.49	
Macadam, 39, 308.02 sq. yd		at .75	29,481.01	
				$137,090.93
Valves, Pits and Drips:				
Drips, at $.027 per lb			$ 3,936.20	
Valves (at manufacturers' quoted prices)			889.90	
Pits (at estimated prices)			186.93	
				$ 5,015.03
Net cost, Acct. No. 231				$647,591.69
Taken as				$647,592.00

EXHIBIT NO. 17

CASE No. 1273

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Net Cost

Trunk Lines and Mains

Development Item

Acct. No. 231

Mains:			
18,013 ft. 8-in. main.....	at $ .876		$15,779.39
Pavement:			
Asphalt, 4,952.01 sq. yd.....	at $3.00	$14,856.03	
Granite, 62.80 sq. yd.....	at .50	31.40	14,887.43
Net cost, development item, Acct. No. 231.....			$30,666.82

Note.—Inasmuch as the items mentioned on this page are not now in use by the company, their net cost has not been included in the total net cost of the property. Since they are regarded as assets of the company, however, their present value is included in the total present value of the property, and their net cost is shown here in order that a proper comparison may be made.

EXHIBIT NO. 17

CASE No. 1273

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Net cost

Trunk Lines and Mains

Cost per Trench Foot of Gas Mains Installed

Wrought Iron

Acct. No. 231

Sizes		1 in.	1¼ in.	1½ in.	2 in.	6 in.	8 in.	10 in.
Excavation	Depth, ft.....	2.7	2.7	2.8	2.8	3.4	3.4	3.6
	Width, ft.....	1.5	1.5	1.5	1.5	2.0	2.0	2.0
	Cu. yds.....	.15	.15	.16	.16	.25	.25	.27
	Cost per cu. yd.	.85	.85	.85	.85	.85	.85	.85
Cost per trench foot	Excavation....	.128	.128	.136	.136	.213	.213	.23
	Laying.....	.002	.002	.002	.002	.035	.035	.04
	Pipe.....	.0388	.0529	.0634	.0846	.487	.914	1.377
	Haul.....	.001	.001	.001	.002	.013	.013	.019
Total.....		.1698	.1839	.2024	.2246	.748	1.175	1.666

COST PER TRENCH FOOT OF GAS MAINS INSTALLED—(*Continued*)

Cast Iron

Sizes		3 in.	4 in.	6 in.	8 in.	10 in.	12 in.	16 in.	20 in.	24. in.
Excavation	Depth, ft...	2.9	3.0	3.3	3.6	3.7	3.9	4.2	4.6	5.1
	Width, ft....	1.5	1.5	1.5	2.0	2.0	2.0	2.5	2.5	3.0
	Cu. yds.....	.16	.17	.185	.27	.28	.29	.39	.425	.57
	Cost per cu. yd.	.85	.85	.85	.85	.85	.85	.85	.85	.85
Cost per trench foot	Excavation .	.136	.145	.158	.23	.238	.247	.332	.362	.485
	Laying.....	.014	.019	.028	.035	.044	.054	.077	.128	.209
	Lead.....	.025	.033	.05	.065	.083	.092	.117	.15	.18
	Yarn.....	.001	.001	.002	.002	.003	.003	.004	.005	.007
	Pipe.....	.134	.21	.35	.526	.725	.924	1.46	2.08	2.72
	Haul.....	.005	.007	.012	.018	.025	.032	.05	.071	.093
Total.....		.315	.415	.600	.876	1.118	1.352	2.040	2.796	3.694

EXHIBIT NO. 17

CASE No. 1273

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Net Cost

Services—Unit Prices

	Acct. No. 232
Based on observation of costs of labor and material, shown in company's records, the average cost of fittings per service, was found to be	$0.35
On the same basis, the average cost of labor, per foot of service, was found to be	$0.07640
The cost of hauling was estimated at	0.00178
Making total labor cost, per foot of service	$0.07818
Taken as	$0.0782

EXHIBIT NO. 17

CASE No. 1273

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Net Cost

Gas Meters

Maker	Size	Number	Unit cost	Acct. No. 233
Goodwin	3 Light	431	$ 5.25	$ 2,262.76
Goodwin	5 Light	156	6.30	962.80
Goodwin	10 Light	22	8.75	192.50
Goodwin	20 Light	17	12.60	214.20
Goodwin	30 Light	2	19.25	38.50
Goodwin	45 Light	5	29.40	147.00
Goodwin	60 Light	7	38.50	296.50
Goodwin	100 Light	3	61.25	183.75
A. M. Co	3 Light	3,010	125.25	15,802.50
A. M. Co	5 Light	16,294	6.30	102,652.20
A. M. Co	10 Light	76	8.75	682.50
A. M. Co	20 Light	78	12.60	982.80
A. M. Co	30 Light	39	19.25	750.75
A. M. Co	45 Light	21	29.40	617.40
A. M. Co	60 Light	15	38.50	577.50
A. M. Co	100 Light	13	61.25	796.25
A. M. Co	200 Light	2	125.50	251.00
Reeves	5 Light	1	6.30	6.30
U. S. M. Co	5 Light	1	6.30	6.30
N. Y. Imp. M. Co	5 Light	2	6.30	12.60
		20,197		
Net cost Acct. No. 233				$127,429.10
Taken as				$127,429.00

EXHIBIT NO. 17

CASE No. 1273

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Net Cost

Gas Meter Installation

	Acct. 234
Installation of 19,631 gas meters at $1.25	$24,538.75
Taken as	$24,539.00

EXHIBIT NO. 18

CASE No. 1273

APPRAISAL OF KINGS COUNTY LIGHTING COMPANY

Determination of Present Value. Public Service Commission, First District

Account	No.	Cost to reproduce	Scrap value	Service value	Depreciation	Remaining wear	Present value
General structures	G-121	$ 23,554.00	$ 929.00	$ 22,625.00	5,001.00	$ 17,624.00	$ 18,553.00
Furnaces, boilers and accessories	G-141a	29,004.00	1,571.00	27,433.00	9,747.00	17,886.00	19,257.00
Water gas sets and accessories	G-143a	94,706.00	3,710.00	90,996.00	28,590.00	62,406.00	66,116.00
Misc. power plant equipment	G-145	2,347.00	93.00	2,254.00	893.00	1,361.00	1,454.00
Works and station structures	221	231,681.00	9,348.00	222,333.00	62,160.00	160,173.00	169,521.00
Holders	222	294,027.00	11,622.00	282,405.00	73,076.00	209,329.00	220,951.00
Purification apparatus	224	31,812.00	1,255.00	30,557.00	9,302.00	21,255.00	22,510.00
Accessory equipment at works	225	81,196.00	5,398.00	75,798.00	16,250.00	59,548.00	64,946.00
Trunk lines and mains	231	819,204.00	140,053.00	679,151.00	175,413.00	503,738.00	668,832.00
Gas services	232	166,151.00	7,726.00	158,425.00	43,715.00	114,710.00	122,436.00
Gas meters	233	127,429.00	.....	127,429.00	27,304.00	100,125.00	100,125.00
Gas meter installation	234	24,539.00	.....	24,539.00	5,258.00	19,281.00	19,281.00
Municipal gas lighting fixtures	235	31,892.00	1,428.00	30,464.00	21,477.00	8,987.00	10,415.00
Gas engines and appliances	236	1,358.00	.....	1,358.00	272.00	1,086.00	1,086.00
Gas tools and implements	237	1,161.00	.....	1,161.00	18.00	143.00	143.00
Gas laboratory equipment	238	1,454.00	.....	1,454.00	218.00	1,236.00	1,236.00
Sub-total, construction accts	.....	$1,960,515.00	$183,133.00	$1,777,382.00	$478,694.00	$1,298,688.00	$1,506,862.00(b)
Land devoted to gas operations	G-110	251,281.00	.....	251,281.00	.....	251,281.00	251,281.00
General equipment	G-122	12,036.00	17.00	12,019.00	2,789.00	9,230.00	9,247.00
Sub-total, non-construction accts	.....	263,317.00	17.00	263,300.00	2,789.00	260,511.00	260,528.00
Total, fixed capital accts	.....	$2,223,832.00	$183,150.00	$2,040,682.00	$481,483.00	$1,559,199.00	$1,767,390.00(b)
Floating capital and operating assets	.....	53,885.00	.....	53,885.00	.....	53,885.00	53,885.00
Total, operating property	.....	$2,277,717.00	$183,150.00	$2,094,567.00	$481,483.00	$1,613,084.00	$1,821,275.00(b)

Note.—(b) These figures include $25,041.00, the value of "Development Items, Trunk Lines and Mains."

EXHIBIT NO. 29

PUBLIC SERVICE COMMISSION, NEW YORK, FIRST DISTRICT

KINGS COUNTY LIGHT COMPANY

CASE NO. 1273

INTRODUCED BY WM. A. BAEHR

MAINS, EXCAVATION FOR

Size	Trench		Cross-sectional area in sq. ft.	Cubic yards per lineal foot of trench
	Width	Depth		
3″	1′ 8″	3′ 6″	5.83	.216
4″	1′ 8″	3′ 6″	5.83	.216
6″	1′ 10″	3′ 8″	6.74	.250
8″	2′ 0″	3′ 10″	7.67	.284
10″	2′ 4″	4′ 0″	9.33	.346
12″	2′ 6″	4′ 2″	10.40	.385
16″	2′ 10″	4′ 6″	12.75	.472
20″	3′ 2″	4′ 10″	15.30	.566
24″	3′ 6″	5′ 2″	18.10	.670

MAINS, CAST IRON

Size	Width per length	Add 2 per cent.	Weight per foot used	Trench	
				Width	Depth
3″	180 lb.	183.6 lb.	15.3 lb.	1′ 8″	3′ 6″
4″	228 lb.	232.6 lb.	19.4 lb.	1′ 8″	3′ 6″
6″	360 lb.	367.2 lb.	30.6 lb.	1′ 10″	3′ 8″
8″	504 lb.	514.1 lb.	42.8 lb.	2′ 0″	3′ 10″
10″	670 lb.	683.4 lb.	56.9 lb.	2′ 4″	4′ 0″
12″	870 lb.	887.4 lb.	74.0 lb.	2′ 6″	4′ 2″
16″	1,300 lb.	1,326.0 lb.	110.5 lb.	2′ 10″	4′ 6″
20″	1,800 lb.	1,836.0 lb.	153.0 lb.	3′ 2″	4′ 10″
24″	2,450 lb.	2,499.0 lb.	208.3 lb.	3′ 6″	5′ 2″

Weight includes bells; 2 per cent. is added for overweight.

Average cover is figured at 3 ft.

Excavation, back-filling and hauling excess dirt at $0.75 per cubic yard.

Cartage at $2.00 per ton average all kinds of material on as much of material as would be handled twice.

For specials add 4 per cent. of cost of pipe.

MAINS, CAST IRON

Size	Cost of pipe	Cartage at $2.00 per ton	Labor laying	Excavation, back-filling and hauling	Joint material	Specials	Totals
3″	$0.219	$0.015	$0.020	$0.162	$0.020	$.009	$0.45
4″	0.278	0.019	0.020	0.162	0.026	.011	0.52
6″	0.438	0.031	0.040	0.188	0.035	.018	0.75
8″	0.612	0.043	0.050	0.213	0.044	.024	0.99
10″	0.814	0.057	0.060	0.260	0.061	.033	1.29
12″	1.060	0.074	0.080	0.288	0.074	.042	1.62
16″	1.581	0.111	0.160	0.354	0.109	.063	2.38
20″	2.189	0.153	0.250	0.425	0.152	.083	3.25
24″	2.981	0.208	0.400	0.502	0.215	.119	4.43

Cast Iron Pipe Prices

Price f. o. b. cars per ton	$27.00
6 per cent. store-room expense	1.62
Total per ton	$28.62

MAINS, WROUGHT IRON

Size	Trench width	Trench depth	Cubic yds. excavation per lin. ft.	Cost pipe	Cost fittings, drips, etc.	6 per cent. S. R. expense on pipe and fittings	Cartage	Labor laying	Excav. and bk.-flg.	Total
1″	1′ 8″	3′ 2″	.196	$.0380	$.0140	$.0031	$.0020	$.0219	$.1470	$.2260
1¼″	1′ 8″	3′ 2″	.196	.0520	.0160	.0041	.0025	.0228	.1470	.2444
1½″	1′ 8″	3′ 2″	.196	.0620	.0180	.0048	.0030	.0226	.1470	.2574
2″	1′ 8″	3′ 3″	.201	.0830	.0210	.0063	.0040	.0689	.1510	.3342

LEAD JOINTS

Size	Weight, lead	Weight, yarn	Cost per joint	Cost per foot
3″	4.5 lb.	.25 lb.	$.238	$0.20
4″	6 lb.	.25 lb.	.313	0.026
6″	8 lb.	.40 lb.	.421	0.035
8″	10 lb.	.50 lb.	.526	0.044
10″	14 lb.	.60 lb.	.732	0.061
12″	17 lb.	.80 lb.	.892	0.742
16″	25 lb.	1.00 lb.	1.203	1.09
20″	35 lb.	1.30 lb.	1.819	1.52
24″	50 lb.	1.75 lb.	2.593	2.15

COST OF MATERIAL

Lead..... 5c at the work
Yarn.....5.3c at the work

PAVING IN STREET

REPAVING:

1. Granite block on sand and portion concrete base—waste and labor, etc., only..... $1.00 per sq. yd.
2. Asphalt on concrete base..... 3.00 per sq. yd.
3. Vitrified brick on edge..... 2.60 per sq. yd.
4. Common brick on edge..... 1.50 per sq. yd.
5. Macadam..... .75 per sq. yd.
6. Granite block on sand-base, laid..... 2.50 per sq. yd.

The foregoing prices are based on a paving contractor furnishing all tools, machinery, labor, and material necessary for relaying pavement in trenches to be excavated and back-filled by the gas company to the sub-grade of the pavement in place.

The prices are based on the assumption that men taking up the pavement will not cover concrete, brick, and cushion sand which has been removed from the pavement, with the excavated earth, and will leave them convenient for replacing in the pavement. Also that in removing pavement with sand, pitch or asphalt filler, the men will not destroy more than 10 per cent. of the brick. To these figures add cost of cutting through pavement.

Paving

Square yards of paving per trench foot for different sizes of pipe and kinds of paving.

Size	Asphalt	Granite	Brick	Belgian block	Macadam
3″	.243	.278	.333	.259	.185
4″	.243	.278	.333	.259	.185
6″	.259	.300	.351	.278	.204
8″	.278	.315	.370	.296	.222
10″	.315	.351	.408	.333	.259
12″	.333	.370	.426	.352	.278
16″	.370	.408	.462	.389	.315
20″	.408	.444	.500	.426	.351
24″	.444	.482	.538	.463	.389

The above figures are based on overcuts on paving as follows:

Asphalt.....6″ Macadam..... 0″
Belgian block.....8″ Granite.....10″
Brick.....16″

Add cost of cutting through pavement to cost per trench foot as obtained from above.

Paving Over Services

Average width of paving cut is 2 ft. plus overcuts in trenches as follows:

Asphalt..... 6″
Brick..... 16″
Granite..... 10″
Belgian block..... 8″
Macadam..... 0″

Length of paving over services is taken from company's records.

PAVING

Analysis of cost of paving over building and lamp services

Kind of paving	Overcut allowed on each side of trench	Width of paving cut	Sq. yds. of paving cut per trench foot	Cost of repaving per trench foot	Cost of cutting through paving per trench foot	Total cost of paving per trench foot
Asphalt	3″	2′ 6″	.278	$0.834	$0.08	$0.914
Brick	8″	3′ 4″	.370	.962	.05	1.012
Granite	5″	2′ 10″	.315	.315	.06	.375
Belgian block	4″	2′ 8″	.296	.296	.06	.356
Macadam	0″	2′ 0″	.222	.167	.04	.207

Width of trench taken as 2 ft.
Paving cut full length of trench, length taken from company's records.
Cost of cutting through figured as shown in accompanying table.

SERVICES

Size	Pipe	Fittings	Six per cent. store-room expense on pipe, valves and fittings	Cartage	Labor, laying and tapping	Excavation and back-filling	Gas stop	Service sleeves	Total
¾″	$1.30	0.16	$0.09	$0.10	$1.90	$6.94	.....	.....	$10.49
1″	1.90	0.23	0.13	0.10	2.00	6.94	.....	.....	11.30
1¼″	2.60	0.31	0.17	0.10	2.10	6.94	.....	.....	12.22
1½″	3.10	0.37	0.21	0.10	2.15	6.94	.....	.....	12.87
2″	4.15	0.50	0.28	0.10	2.30	6.94	$2.44	$3.40	20.11
3″	8.70	1.40	0.58	0.15	2.60	6.94	3.16	3.40	26.57
4″	12.40	1.49	0.83	0.35	3.00	6.94	6.45	3.40	34.86

The average length of service is taken at 50 ft. and is based on the average length of service, laid from 1906 to 1910.
Cartage is taken at $1.00 per ton and excavation and back-filling at $0.75 per cubic yard.
The cost of fittings was taken as 12 per cent. of the cost of the pipe.
Gas stops, 2 in., iron cock, brass plug. Gas stops, 3 and 4 in., iron cock, brass washers.
Average width of trench, 2 ft. Average depth of trench, 2 ft. 6 in.

LAMP SERVICES

Not including paving

Size	Pipe	Fittings	Riser	Six per cent. storeroom expense	Cartage	Labor, laying and tapping	Excavation backfilling	Total
¾"	0.55	0.07	0.42	$0.06	$0.10	$3.00	$2.91	$7.11
1 "	0.80	0.10	0.42	0.08	0.10	3.05	2.91	7.46
1¼"	1.09	0.13	0.42	0.10	0.10	3.10	2.91	7.85

Average lamp service taken as 21 ft. long.
Average riser taken as 11 ft. of 1 in. pipe.
Cartage, excavation and cost of fittings taken on same basis as on house services.

EXHIBITS "A," "B," "C" AND "D"

PUBLIC SERVICE COMMISSION, NEW YORK, FIRST DISTRICT

KINGS COUNTY LIGHTING COMPANY

CASE No. 1273

INTRODUCED BY WM. W. RANDOLPH

(As of December 13, 1910)

SUMMARY

	Cost new	Deferred repairs
Exhibit "A"—Buildings	$ 310,800.00	$ 9,480.00
Exhibit "B"—Machinery	649,398.00	33,798.00
Exhibit "C"—Real Estate	969,424.00	
Exhibit "D"—Distribution System:		
(1) Mains	1,292,580.00	129,264.00
(2) Consumers' Services	398,184.00	79,632.00
(3) Lamp Services	65,940.00	21,984.00
(4) Consumers' Meters	209,244.00	35,400.00
Working Capital	150,000.00	
Cost to develop sales of gas to private consumers from zero to over 507,000,000 cu. ft., annually	600,000.00	

EXHIBIT "A"

BUILDINGS	Cost new	Deferred repairs
Generator House No. 1..... 52'8"×50'2"×33'0" ground floor to truss chord, two story building, brick walls, gable roof monitor type corrugated iron on steel on steel trusses. Including machinery foundations. Also included with this building is the runway between No. 1 and No. 2 houses.	$ 16,100.00	$ 450.00
Generator House No. 2..... 95'6"×53'0"×48'11" ground floor to truss chord, two story building, brick walls, gable roof monitor type slate on steel on steel trusses. Including machinery foundations. Also included with this building is pit partly under Generator House No. 2 and partly under Wash Room.	41,000.00	600.00
Boiler House, Engine House, Exhauster House, Tar Tank House and Condenser House..... Boiler House, 53'1"×42'0"×16'8" ground floor to truss chord, one story building, brick walls, gable roof corrugated iron on steel on steel trusses. Including machinery foundations. Engine and Exhauster House, 50'4"×41'0" a 25'6" ground floor to truss chord, two story building, brick walls, gable roof slate on wood on wood trusses. Including machinery foundations. Tar Tower House, 43'0"×26'4"×89'0" bottom of settling wall to eaves, three story building, brick walls, peaked roof slate on wood. Including machinery foundations. Also included with this building are the tar wells under it. Condenser House, 44'4"×41'0"×24'2" ground floor to truss chord, two story building, brick walls, gable roof, slate on wood on wood trusses. Including machinery foundations.	45,900.00	700.00
Purifier House:..... 67'4"×49'4"×27'0" ground floor to truss chord, two story building, brick walls, gable roof monitor type slate on wood on steel trusses,	$ 14,400.00	$ 400.00

BUILDINGS (*Cont'd*)	Cost new	Deferred repairs
Repair Shop and Stable:..... 67′0″×41′0″×22′6″ high ground floor to truss chord, two story building, brick walls, gable roof, slate on wood on wood trusses.	12,300.00	300.00
Office and Meter House:..... 40′0″×44′0″×37′10″ ground floor to truss chord, three story building, brick walls, gable roof slate on wood on wood trusses. Including machinery foundations.	17,900.00	600.00
Coal Shed:..... 108′2″×52′0″×52′7″ brick floor to eaves, steel and wood construction, roof monitor type tar and gravel on wood. This building includes runways from coal shed to Houses No. 1 and No. 2.	62,500.00	1,900.00
Coal Tower House on Dock:..... Included with coal handling machinery.	.....	.....
Artesian Well House:..... 14′0″×14′0″×22′0″ basement floor to eaves, brick walls, roof slate on wood, gable type.	2,100.00	50.00
Men's Room House (Wash Room)..... 30′8″×31′2″×24′3″ ground floor to truss chord, two story building, brick walls, roof tar and gravel on wood.	$ 4,800.00	$ 150.00
Valve and Boiler House at Holder Station:.... 65′2″×27′0″×14′0″ boiler house floor to truss chord; 23′4″ valve house from basement floor to truss chord. Brick walls, roof (large ventilator) part slate on wood, part tin on wood. Including machinery foundations.	7,200.00	250.00
Dock (Pier): Frame construction, 582′6″ long.....	24,800.00	2,000.00
Fences and Paving:.....	10,000.00	500.00
	$259,000.00	$7,900.00
20 per cent. Overhead Charges.....	51,800.00	1,580.00
Total Buildings.....	$310,800.00	$9,480.00

EXHIBIT "B"

MACHINERY	Cost new	Deferred repairs
GENERATING APPARATUS:		
Three 8′ 6″ Lowe water gas sets to the outlet of washer, with 8′ 6″ diameter. Generators and 8′ 0″ dia. carburetters and superheaters. Two located in generator house No. 1, and one in generator house No. 2	$29,700.00	$2,000.00
One Williamson set of water gas apparatus. Diameter of generator 12′, diameter of superimposed twin carburetter and superheater 14′, total height 46′ 4″	22,000.00	.....
BOILERS:		
Four 106 H. P. Babcock & Wilcox boilers, water tube, including boiler room piping and two steel stacks 39″ dia.×120′ high. Located in boiler room	18,680.00	2,500.00
One 215 H. P. Babcock & Wilcox water tube boiler, including boiler room piping and one steel stack 39″ dia.×122′ 6″ high. Located in boiler room		
One 90 H. P. vertical tubular boiler including steel stack 2′ 0″ dia.×40′ 0″ high. Located in Hopper House on dock. Included with coal handling machinery		
One 50 H. P. vertical tubular boiler including steel stack 20″ dia.×25′ high. Located in valve house at the 65th Street Holder Station	700.00	100.00
One 100 H. P. horizontal tubular boiler including steel stack 30″ dia.×65′ high. Located in valve house at the 65th Street Holder Station	2,090.00	100.00
SCRUBBERS:		
One primary scrubber 4′×7′×20′ high. Located in generator house No. 2	$770.00	$75.00
One shaving scrubber 10′ dia.×27′9″ high, including foundation. Located in yard	3,000.00	100.00
One shaving scrubber 10′ dia.×25′ high, including foundation. Located in yard	2,500.00	100.00
Two scrubbers 7′ dia.×22′ 1″ high, including foundation. Located in yard	4,620.00	200.00
CONDENSERS:		
Two condensers 7′ dia.×22′ 1″ high, including foundations. Located in yard	6,820.00	1,000.00
Two condensers 7′ dia.×22′ 1″ high. Located in condenser room	5,280.00	1,000.00

	Cost new	Deferred repairs
TAR AND AMMONIA EXTRACTORS:		
One P. & A. tar extractor with 16″ connections. Located in tar house	2,200.00	1,000.00
One standard rotary washer scrubber 7′ dia. × 12′ 3½″ long. Located in condenser house	4,180.00	500.00
PURIFIERS:		
Four purifiers 16′ × 24′ × 7′ 6″ deep. Located in purifier house	20,350.00	1,000.00
HOLDERS:		
One relief holder in steel tank, capacity 100,000 cu. ft., including foundation. Located in yard	$18,600.00	$500.00
One storage holder in steel tank capacity 100,000 cu. ft., including foundation. Located in yard	19,000.00	1,000.00
One storage holder in steel tank, capacity 500,000 cu. ft., including foundation. Located at 65th Street Holder Station	53,700.00	2,000.00
One storage holder in steel tank, capacity 2,000,000 cu. ft., including foundation. Located at 65th Street Holder Station	175,500.00	3,500.00
EXHAUSTERS AND BLOWERS:		
One No. 10 Roots exhauster and one 13″ × 12″ direct connected N. Y. safety vertical engine. Located in condenser room	3,300.00	150.00
One No. 8 Roots exhauster and one 10″ × 12″ direct connected N. Y. safety vertical engine. Located in engine room	1,850.00	100.00
Two No. 6 Roots exhausters and two 7″ × 9″ direct connected Oil City Boiler Works Vertical Engines. Located in engine room.	2,680.00	300.00
Two No. 11 Buffalo Forge Blowers and two 13″ × 12″ Sturtevant engines, double belted. Located in engine room	4,840.00	250.00
One N. Y. blower and one 90 H. P. Terry Turbine direct connected, including 6½″ × 12″ × 12″ Smith-Vaile condenser pump. Located in Generator House No. 2	$3,020.00	.....
One shaving blower and one 6″ × 6″ Sturtevant Vertical Engine (belted). Located in loft over stable. Including piping, etc., to shaving blower	820.00	.....
One Turbo blower 15″ dia. connected to Spencer Damper Regulator. Installed on boilers Nos. 1 and 2. Included with boilers.	.....	.....

	Cost new	Deferred repairs
PUMPS:		
Two 6″×4″ Worthington duplex pumps. Located in boiler room	$250.00	$.....
One 7″×7″×13″ Cameron simplex pump. Located in basement of engine room	350.00	.....
One 6″×5¾″×6″ Worthington duplex pump. Located in basement of engine room	160.00	.....
One 10″×10½″×18″ Cameron simplex pump. Located in Hopper house in dock	690.00	.....
One 7½″×6″×10″ Worthington duplex pump. Located in Artesian well house	270.00	.....
One 5″×4″×8″ Davidson simplex pump. Located in basement of the engine room	130.00	.....
One 6″×3″×7″ Cameron simplex pump. Located in basement of the engine room	140.00	.....
Two 4½″×2¾″×4″ Worthington duplex pumps. Located in basement of engine room	165.00	.....
Two 6″×5¾″×6″ Worthington duplex pumps. Located in tar house	320.00	.....
One 6″×3″×7″ Cameron simplex pump. Located in valve room 65th Street Holder Station	140.00	.....
Physical decay on all the above pumps	.....	250.00
One Smith-Vaile jet condenser pump. Included with blower and turbine unit.		
STATION METERS:		
One 11′3″×11′3″ station meter located in office building	5,170.00	1,000.00
One equitable proportional meter with 16″ connections. Located in office building. Capacity 150,000 cu. ft. per hour	1,200.00	50.00
One Westinghouse air meter No. 12, located in the engine room	80.00	.....
ELEVATORS:		
One steam hydraulic elevator, located in Generator House No. 2 One steam hydraulic elevator, located in purifying house One elevator with crane engine hoist. located in generator house No. 1	3.330.00	400.00

	Cost new	Deferred repairs
SCALES:		
One six-ton wagon scale. Located outside office building. Including pit, etc.....	$500.00	$100.00
One four-ton platform scale. Located in coal shed.....	160.00	.....
One four-ton track scale. Located in hopper house on dock. Included with coal handling machinery.	.....	.....
COAL HANDLING APPARATUS:		
One grab bucket hoist and cableway complete, consisting of steel mast and gaff, clamshell bucket, drum hoist with 617′ of steel trestle and double cable tracks including 4 three-ton cars, located on dock. Also included with this is hopper house on Dock R. R., track scales, engines and 90 H. P. boiler.....	33,000.00	2,000.00
COAL BUGGIES:		
Four side drop cars, 2000 lbs. capacity. Located in generator house No. 2.....	770.00	
Two side drop cars, 1000 lbs. capacity. Located in generator house No. 2.....	100.00	100.00
Two two-wheel coal buggies. Located in generator house No. 1.....	100.00	
SHOPS:		
Machine shop equipment.....		
Blacksmith shop equipment.....	2,200.00	200.00
Carpenter shop equipment.....		
Meter shop equipment.....		
Laboratory equipment.....	1,100.00	150.00
TANKS, WELLS, ETC.		
One steel oil tank 15′ dia. × 15′ high, capacity 20,386 gals. Including foundation. Located in the yard	750.00	
One steel oil tank 35′ dia. × 35′ high. Including foundation. Capacity 251,881 gals. Located in the yard.....	8,250.00	
One steel well water tank 13′ dia. × 20′ high. Capacity 19,858 gals. Located in tar tower	550.00	500.00
Two steel tar tanks 10′ dia. × 6′ high. Capacity each 3,500 gals. Located in tar tower	440.00	
One settling well 40′ dia. × 12′ deep, brick with two brick partitions. Capacity 112,766 gals. Located in yard.....	4,400.00	

	Cost new	Deferred repairs
TANKS, WELLS, ETC. (Cont'd.)		
One brick tar well under tar house 32'6"×13'×14'. Included with building. Capacity 35,000 gals.	.....	.....
One brick tar well under tar house 32'6"×14'. Included with building. Capacity 18,000 gals.	.....	.....
One brick tar well under tar house 23'×6'2"×14'. Included with building. Capacity 14,850 gals.	.....	.....
Two driven pipe wells at works..... One driven pipe well at Holder Station..	1,100.00	200.00
MISCELLANEOUS:		
One feed water heater 1'6" dia.×6'8" high, Berryman type. Located in the boiler room..... One feed water heater 1'6" dia.×4' high, Berryman type. Located in the tar tower ..... Two oil heaters 2' dia.×6' high, Berryman type. Located in generator house No. 1.....	$ 550.00	$ 190.00
One Bristol indicating and recording pyrometer, located in the office and connected to the Williamson water gas apparatus....	440.00	.....
One 3" type "G" Worthington water meter. Located in office basement	120.00	.....
One 1¼" Worthington oil meter. Located in tar house	80.00	20.00
One incinerite for burning refuse. Located in office basement	110.00	.....
One 20" Smith & Sayre governor. Located in valve room 65th Street Holder Station.....	530.00	130.00
Gauges—Miscellaneous.....	550.00	200.00
Yard connections—piping, valves, valve boxes, manholes, etc.....	55,000.00	3,000.00
Street department tools and tool wagon...	$ 600.00	$ 100.00
Rented arc lamps—136 inside, 41 outside..	1,450.00	150.00
48th Street office equipment and..... 48th Street shop equipment.....	3,750.00	450.00
General stable equipment.....	6,000.00	1,500.00
	$541,165.00	$28,165.00
20 per cent. overhead charges.....	108,233.00	5,633.00
Total machinery.....	$649,398.00	33,798.00

EXHIBIT "C"

REAL ESTATE		Value
REAL ESTATE AT WORKS:		
Located at 55th Street and First Avenue, described and valued by David Porter, Esq., on pages 616 and 632 of minutes of hearing before the State of New York Public Service Commission for the First District, in case No. 1273.....	472,680 sq. ft.	$815,646.00
REAL ESTATE AT HOLDER STATION:		
Located at 65th Street and Ninth Avenue, described and valued by David Porter, Esq., on pages 613, 614 and 615 of minutes of hearing before the State of New York Public Service Commission for the First District, in case No. 1273.		
Lots No. 15 and 17 in block No. 5749.	126,270 sq. ft.	126,270.00
Lot 46 in block 5742.....	25,685 sq. ft.	11,167.00
One lot in block 5743.....	4,029 sq. ft.	1,527.00
One lot in block 5750.....	10,120 sq. ft.	4,328.00
Lot No. 9 in block 5764.....	2,435 sq. ft.	1,186.00
Lot No. 28 in block 5763.....	30,000 sq. ft.	9,300.00
David Porter's value as of December 31, 1910.....		$969,424.00
(See page 614 of minutes.)		

EXHIBIT "D"

Distribution System. Mains

Size	Kind of paving	No. of feet	Rate per foot	Amount	Total amount	
1".....	Unimproved...	245	$ .25	$61.00	$61.00	
1¼".....	Unimproved...	364	.28	102.00	102.00	
1½".....	Asphalt.....	290	1.10	319.00		
	Unimproved...	2,640	.30	792.00		
		2,930			1,111.00	
2".....	Unimproved...	2,764	.35	967.00	967.00	
3".....	Asphalt.....	2,190	1.41	3,088.00		
	Macadam.....	2,488	.69	1,717.00		
	Unimproved...	8,116	.50	4,058.00		
		12,794			8,863.00	
4".....	Asphalt.....	39,386	1.70	66,956.00		
	Granite.....	434	1.48	642.00		
	Brick.....	3,963	1.95	7,728.00		
	Belgian block.	6,247	.89	5,560.00		
	Macadam.....	81,132	.91	73,830.00		
	Unimproved...	223,407	.70	156,385.00		
		354,569			311,101.00	
6".....	Asphalt.....	74,284	1.90	141,140.00		
	Granite.....	663	1.68	1,114.00		
	Brick.....	1,249	2.15	2,685.00		
	Belgian block..	6,348	1.09	6,919.00		
	Macadam.....	98,101	1.11	108,892.00		
	Unimproved...	185,739	.90	167,165.00		
		366,384			427,915.00	
8".....	Asphalt.....	24,167	$2.20	$53,167.00		
	Macadam.....	5,752	1.37	7,880.00		
	Unimproved...	7,382	1.15	8,489.00		
		37,301			$69,536.00	
10".....	.....	109	1.50	164.00	164.00	
12".....	Asphalt.....	6,371	2.97	18,922.00		
	Macadam.....	12,153	2.05	24,914.00		
	Unimproved...	30,026	1.80	54,047.00		
		48,550			97,883.00	
16".....	Macadam.....	6,955	3.03	21,074.00		
	Unimproved...	8	2.75	22.00		
		6,963			21,096.00	

DISTRIBUTION SYSTEM. MAINS—*Continued*

Size	Kind of paving	No. of feet	Rate per foot	Amount	Total amount	Deferred repairs
20".....	Asphalt.....	3,688	$4.98	$18,366.00		.....
	Macadam.....	4,904	3.91	19,175.00		.....
	Unimproved...	726	3.60	2,614.00		.....
		9,318			$40,155.00	.....
24".....	Unimproved...	61	4.50	275.00	275.00	.....
					$979,229.00	
				10 per cent. G. C. P....	97,921.00	
					$1,077,150.00	$107,720.00
				20% overhead charges..	215,430.00	21,544.00
				Total mains.....	$1,292,580.00	129,264.00

CONSUMERS' SERVICES

Size	No. of services	Rates per service	Amount	Deferred repairs
1 "	184	$21.50	$ 3,956.00	.....
1¼"	5,075	23.50	119,262.00	.....
1½"	7,346	23.70	174,100.00	.....
2 "	132	28.50	3,762.00	.....
3 "	14	41.00	574.00	.....
	12,751		$301,654.00	.....
	10 per cent. G. C. P.....		30.166.00	.....
			$331,820.00	$66,360.00
	20 per cent. overhead charges.....		66,364.00	13,272.00
Total consumers' services.....			$398,184.00	$ 79,632.00

LAMP SERVICES

Size	No. of services	Rate per service	Amount	Deferred repairs
¾"	2,505	$10.00	$25,050.00	.....
1"	1,500	11.00	16,500.00	.....
1¼"	700	12.00	8,400.00	.....
	4,705	10 per cent. G.C.P.	$49,950.00	.....
			5,000.00	.....
			$54,950.00	$18,320.00
	20 per cent. overhead charges.....		10,990.00	3,664.00
	Total lamp services.....		$65,940.00	$21,984.00

CONSUMERS' METERS

Size	No. of meters	Rate per meter	Amount	Deferred repairs
3 Lt.	3,246	$5.55	$18,015.00	.....
5 Lt.	16,135	6.50	104,878.00	.....
10 Lt.	95	9.10	865.00	.....
20 Lt.	92	12.60	1,159.00	.....
30 Lt.	39	19.10	745.00	.....
45 Lt.	25	28.80	720.00	.....
60 Lt.	18	37.00	666.00	.....
100 Lt.	14	57.00	798.00	.....
200 Lt.	2	117.00	234.00	.....
	19,666	.....	$128,080.00	.....
	Installing 19,666 meters at $1.50 ..		29,499.00	.....
	2,099 meter locks		945.00	.....
			$158,524.00	.....
	10 per cent. G. C. P		15,846.00	.....
			$174,370.00	$29,500.00
	20 per cent. overhead charges.....		34,874.00	5,900.00
	Total consumers' meters.....		$209,244.00	$35,400.00

CHAPTER X

EXAMPLES OF IMPORTANT APPRAISALS

Street Railway Properties in Chicago.—The former controversy between the traction companies in Chicago and the local authorities resulting in the present satisfactory relations have formed one of the most notable developments in public utility history. In 1905 there were several different companies operating in Chicago, with franchises in certain streets expired or about to expire, and, in consequence, the physical properties had been allowed to deteriorate to a marked degree. The city authorities were refusing to grant new franchises without additional concessions from the corporations so that the service was all but disgraceful. In this situation a "Traction Commission" of three engineers, Messrs. Bion J. Arnold, Mortimer E. Cooley and A. B. du Pont, were appointed "to consider the detailed inventories and estimates of value to be submitted by the Street Railway Companies, to investigate the same and to ascertain whether the values thus listed were reasonable, fair and just."

The Commission not satisfied with the inventories and values prepared and submitted by the Street Railway Companies, employed much of the office and field organization of the Arnold Company, supplementing this force with its own employees, for the purpose of making an independent appraisal of the Street Railway properties. Complete examination of the physical properties was made during 1906 of the Chicago Union Traction Company's and the Chicago City Railway Company's Properties. The result of these appraisals showing the cost to reproduce new, the depreciation determined in the main from field measurements, present value, and in addition diagrams for each piece of special-work both in track and overhead construction together with complete inventory of parts and unit prices, was published in book form, one relating to each company, as a report of the work of the Commission.

The appraisals attempted to evaluate not only the physical property useful in serving the public but also unused but still

existing cable systems as well as intangible values attaching to good will, going value and franchises.

The valuations were probably more full and precise than anything that had been attempted up to the time in connection with properties of such size; the estimated present values aggregating slightly over $50,000,000, whereas the Companies had claimed a valuation of over $70,000,000.

A year or two later further valuations were made of the South Chicago Railway Company and the Calumet Electric Street Railway Company's properties along the same lines as followed in the 1906 appraisals. The reports of these two appraisals were published in separate books which also give full details as to inventory, unit prices and final values. Again in 1910 the Commission submitted another report as to the value of the physical property of the Chicago Consolidated Traction Company as of Nov. 1, 1909, which, while along the same lines as the previous valuations, may be considered as embodying the most recent, complete and approved methods adopted by this Commission in appraisal work as the result of a large experience and several years effort in this particular line. On the following pages are given typical extracts from this report as showing exactly the methods followed by the Traction Commission.

In all the valuations made by the Commission, unit prices were determined for local conditions and applied to the quantities shown in the inventory. To the total, thus obtained, percentages were added as follows to cover "organization, engineering and incidentals."

To Track was added 15 per cent.
To Electrical Distribution System was added 15 per cent.
To Rolling Stock was added 5 per cent.
To Power Plant Equipment was added 10 per cent.
To Buildings was added 15 per cent.
To Paving was added 15 per cent.
To Tools was added 0 per cent.
To Real Estate. The figures of real estate appraiser were taken without additions.

In the case of the Chicago Consolidated Traction Company, the amount of increase by the use of the above percentages was, in even figures, $654,600. That is an average of 13 per cent. added to the total $5,056,000 obtained from the inventory by the application of the unit prices assumed, as related to the prop-

erty aside from tools and real estate which aggregated $172,400, making the cost of reproduction new, as covering these three items, $5,882,987.40. On this amount 5 per cent. additional was allowed for "legal expenses, carrying charges and contingencies," $294,149.37. On this new sum total of $6,177,136.77 an additional 15 per cent. was allowed for "conducting the work, furnishing equipment and brokerage," $926,570.52, making a grand total of $7,103,707.29 as the total cost of reproduction new. From these figures it will be seen that to the base figures, obtained by using the unit prices and the value of tools and real estate without additions, namely $5,288,406, there was added by the use of the various percentages shown $1,875,300, that is, almost exactly 36 per cent. in order to obtain the final value of the physical property without any inclusion of franchise, good will or going values. Attention is called to this percentage of thirty-six because so many lay minds unaccustomed to appraisal work and the necessity for making allowances to cover the installation of physical property, aside and independent of the contract price, overlook this necessary allowance which must be made and which is an indivisable part of the total cost of construction.

Among the many and interesting points to be settled in connection with the adjustment of difference between the City and the Traction Companies were:

(*a*) The basis to be used in determining the value of the old cable road systems. This matter was finally adjusted by allowing the value of those cable systems which the companies by ordinances had been compelled to keep in condition ready for operation and on the other hand allowing nothing for those cable systems which were entirely obsolete and practically abandoned.

(*b*) What allowance, if any, should be made for the pavements laid by the companies on their right of way? The Commission submitted figures both including and excluding the value of pavement without specific recommendation as to whether same should be allowed in the valuation of the property but in the final settlement with the companies, the figure agreed upon included paving.

(*c*) Good will or going value was considered in connection with traffic agreements but no allowance was made under this head on the ground that as the agreements related to systems

which were co-operating, the value of such contracts was not material where all were under the same control.

(*d*) The value of the intangible property was particularly complicated owing to the following facts.

"*First.*—The difficulty of determining what are the exact legal rights of the companies in any given street or part of street, in absence of a direct and final judicial decision as to these rights;

"*Second.*—The difficulty in estimating the value of a line of street railways, consisting of several parts, where each of these parts is operated under a different tenure due to the character of the ordinances or franchises, respectively; and

"*Third.*—The difficulties arising from the absence of exact information as to the receipts and expenditures on the several parts of a single line covered by franchises of different length and character."

In order to help solve the problem the Commission retained in consultation in connection with franchise values, Prof. Henry C. Adams and with his assistance, the following theory was adopted:

The routes and car mileage, with accompanying gross earnings for each route, were worked out and apportioned under each franchise, being based on the assumption that gross earnings were everywhere proportionate to car mileage. In a similar way the operating expenses, which, including taxes and maintenance, were found in Chicago to approximate 70 per cent. of the gross income, were assigned under each franchise. The cost of reproduction of the physical property under each franchise was easily determined and the value of jointly used properties such as power-houses, car barns, tools, cars, etc., were apportioned on a car mileage basis. Increase in earnings for the unexpired life of franchises was also considered and the value of the estimated net earnings for future years was finally derived after deducting an amount required to support invested capital at the rate of 5 per cent. compound interest. The net earnings capitalized as to their present worths were taken as the value of the franchises.

In connection with the Chicago appraisals it is important to note that while "present values" were the ones adopted in determining final values, the basis of settlement and agreement with the Traction Companies expressly provided that the physical properties were to be largely improved, practically reconstructed in part, and the cost of doing this work, including allowances for a 10 per cent. profit and other allowances to the

Companies, was to be capitalized and added to the agreed valuation of the tangible and intangible properties. Consequently the renewed property has in effect been capitalized twice, once in the original valuation and the second time when replaced by the new, so that a revaluation at this time would show, quite a different ratio, between present values and capitalization, from that shown by the previous valuation. This leads to the reflection that perhaps the City would have been better off if cost of reproduction new (replacements to be paid for by the Companies) instead of present value had been allowed in settlement with the Companies, as they desired.

CHICAGO CONSOLIDATED TRACTION VALUATION

General Summary

Exhibit	Item	Cost, new	Present value
I	Track	$2,091,214.13	$1,121,216.38
II	Electric power distribution	855,966.20	693,481.95
III	Rolling stock	707,170.80	195,118.77
IV	Power plant equipment	703,084.92	417,886.81
V	Tools, supplies, materials, etc	88,177.91	71,999.52
VI	Buildings	338,626.20	265,417.00
VII	Real estate	84,228.00	84,228.00
VIII	Paving	1,014,519.24	437,226.70
		$5,882,987.40	$3,286,575.13
	Legal expenses, carrying charges and contingencies, 5 per cent	294,149.37	164,328.76
		$6,177,136.77	$3,450,903.89
	Conducting work, furnishing equipment and brokerage, 15 per cent.[1]	926,570.52	517,635.59
	Grand Total	$7,103,707.29	$3,968,539.49

[1] For conducting work an allowance of 10 per cent. was made, as a profit on construction work, in accordance with the provision of the ordinances. The remaining 5 per cent. is an allowance for securing the money, brokerage and incidental expenses.—*Author.*

CLASS A-1

9 IN. 129 LB. LORAIN RAIL, 58 FT. LENGTHS, CRUSHED STONE BALLAST, WELDED JOINTS. TYPE NO. 3. BOARD OF SUPERVISING ENGINEERS

ESTIMATE OF COST TO PRODUCE ONE MILE OF SINGLE TRACK 10 FT. 2 IN. CENTERS

UNIT COST ESTIMATE

	Unit	Quantity	Unit cost	Total cost
Rail	Ton	202.71	$39.00	$7,905.69
Tie rods	Each	910	.25	227.50
Joints	Each	195	5.00	975.00
Ties	Each	2,604	.70	1,848.00
Tie plates	Per 100	5,280	9.00	475.20
Screw spikes	Per 100	10,560	2.15	227.04
Lag screws (fetter drive)	Per 100	10,560	.40	42.24
Cement	Bbl.	1,263	1.60	2,020.80
Sand, torpedo	Cu. yds.	600	1.00	600.00
Stone, crushed	Cu. yds.	2,162	1.50	3,243.00
Track labor (see details attached)	Ft.	5,280	.79	4,171.20
Track teaming (see details attached)	Ft.	5,280	.99	5,227.20
				$26,962.87
Organization, engineering and incidentals, 15 per cent				4,044.43
Total cost per mile				$31,007.30

CLASS A-1

ITEMIZED LABOR CHARGES

EXCAVATION:		
Subgrade	.30	
Grading	.03	
Total	.33	.33
TRACK LAYING:		
Ties	.02	
Tie plates and fastenings	.02	
Rails and fastenings	.10	
Tie Rods	.02	
Surfacing and aligning	.05	
Total	.21	.21
Ballast		.10
Concreting		.15
Total labor		.79
Teaming, including hauling rails		.99
		$1.78

Handling of scrap included in excavation.

Following charges included in organization, etc.

Temporary track	.14
Tools, supplies	.10
Watchman	.14
Miscellaneous	.06
	.44

DEPRECIATION OF ONE MILE OF SINGLE TRACK. CLASS A-1

Depreciation Due to Substructure

	Cost new	Scrap value	Wearing value
Ties	$1,848.00		$1,848.00
Tie-rods	227.50		
2.5 tons scrap at $10.00		$25.00	202.50
Tie-plates	475.20		
7 tons scrap at $10.00		70.00	405.20
Screw spikes	227.04		
3 tons scrap at $10.00		30.00	197.04
Lag screws	42.24		42.24
Cement, Sand, Stone } in concrete	4,086.30		4,086.30
Stone ballast, 1,185 cu. yd. at $1.50	1,777.50		
Minus 25 per cent. for reclaiming		444.38	1,333.12
Labor at 25 cents per foot	1,320.00		1,320.00
Teaming at 50 cents per foot	2,640.00		2,640.00
	$12,643.78	$569.38	$12,074.40

Life of substructure, 25 years.

Annual depreciation in per cent. of wearing value..... 4 per cent.

Depreciation Due to Rail

	Cost new	Scrap value	Wearing value
Rail—cost of rail	$7,905.69		
Scrap at $11.00 per ton..$2,119.81 Less 5 cents per foot for removal..... 264.00			
	$1,855.81	1,855.81	6,049.88
Joints	795.00		795.00
Labor depreciated with rail .21 per foot	1,108.80		1,108.80
Teaming depreciated with rail .32 per foot	1,689.60		1,689.60
	$11,679.99	$1,855.81	$9,823.28

Parts not Depreciated

Excavation	Labor at .33 Teaming at .17	.50 per foot	$2,640.00

Total Cost of Parts Depreciated

Cost of parts depreciated with substructure	$12,643.78
Costs of parts depreciated with rail	11,679.09
Cost of parts not depreciated	2,640.00
	$26,962.87

$12,643.78 = 46.9 per cent. of $26,962.87
11,679.09 = 43.3 per cent. of 26,962.87
2,640.00 = 9.8 per cent. of 26,962.87

Above percentages to be used to distribute to substructure and rail the proper proportion of parts of cost yet to be depreciated.

Parts Yet to be Depreciated

Organization, engineering, incidentals, etc., 15 per cent	$ 4,044.43
46.9 per cent. of $4,044.43 = amount to be depreciated with substructure	1,896.84
Actual wearing value of substructure	12,074.40
	$26,962.87
Total value of substructure to be depreciated, 4 per cent. annually	$13,971.24
4 per cent. of $13,971.24 = $558.85 annual depreciation.	
43.3 per cent. of $4,044.43 = amount to be depreciated with rail	1,751.24
Actual wearing value of rail	9,823.28
Total wearing value of rail	$11,574.52

Original depth of head, 80/64.
Scrap depth of head, 40/64.
Wearing depth of head, 40/64.

1/40 of $11,574.52 = $289.36, depreciation due to each 1/64 in. of wear.

9.8 per cent. of $4,044.43 = amount of 15 per cent. charge not depreciated	$ 396.35
Cost of parts not depreciated	2,640.00
	$ 3,036.35

Recapitulation

Parts depreciated with substructure	$13,971.24
Scrap value of substructure	569.38
Parts depreciated with rail	11,574.52
Scrap value of rail	1,855.81
Parts not depreciated (excavation)	3,036.35
Total	$31,007.30

CHICAGO & NORTH SHORE STREET RAILWAY COMPANY

Edgewater Power Plant Bldg. & Car House Built 1894

	Cost new
Preparation of site	$ 100.00
Excavation and fill	1,178.00
Foundations and concrete floors	7,077.00
Superstructure masonry	21,006.00
Structural steel and iron	7,046.00
Carpenter work	9,755.00
Mill-work, including hardware, painting and glazing	1,976.00
Roofing	1,203.00
Sheet metal and skylights	1,431.00
Plastering	360.00
Painting	200.00
Drainage system (pumping and lockers)	1,147.00
Heating system	286.00
Lighting system	331.00
Elevator, etc	150.00
	$53,246.00
15 per cent. added for engineering and incidentals	7,986.90
	$61,232.90
Depreciation, 16 years at 1 1/2 per cent. per annum	14,695.90
Total present value	$46,537.00

SINGLE TRACK BRANCH OFF
45 to 90 degrees
UNIT COST ESTIMATE

	Unit quantity	Unit cost	Total cost
Layout:			
1 Switch and mate.....$125.00			
1 Frog..... 45.00			
Tangent rail included, 50 ft. at .75..... 37.50			
Curved track included, 75 ft. at 3.00..... 225.00			
Joints 16 pr. complete at $1.10..... 17.60			
Tie plates 150 at .09..... 13.50			
	$463.60		$463.60
Excavation.....Cu. yds.	43	.50	21.50
Ballast.....Cu. yds.	40	1.50	60.00
Ties.....B. M.	1200	30.00	36.00
Spikes.....Keg	1	4.00	4.00
Labor.....			100.00
Total cost.....			$685.10

DOUBLE TRACK BRANCH OFF
45 to 80 degrees
UNIT COST ESTIMATE

	Unit quantity	Unit cost	Total cost
Layout complete (ties, plates and joints included).....Each	1	$1,000.00	$1,000.00
Excavation .....Cu. yds.	80	.50	40.00
Ballast .....Cu. yds.	72	1.50	108.00
Ties.....B. M.	2500	30.00	75.00
Spikes.....Keg	2	4.00	8.00
Labor.....			200.00
Total cost.....			$1,431.00

POWER PLANT EQUIPMENT
EDGE WATER
CHICAGO & NORTH SHORE STREET RAILWAY CO.

Description	Per cent. depreciation (annual)	Cost new	Scrap value	Cost new less scrap	Depreciation	Recent repairs	Present value	Rehabilitation value 8/4/10	Two years wearing value	Rehabilitation value discarded Nov. 1, 1911
Machinery foundations	4	$11,184.06	.....	$11,184.06	$4,740.80	.....	$6,433.26	.....	.....	.....
Fuel oil system	4	4,182.00	$454.00	3,728.00	869.00	.....	3.313.00	$1,730.00	.....	.....
Boiler and Settings (2100 H. P. water tube)	4	24,350.00	840.00	23,510.00	10,161.00	$2,672.00	16,861.00	9,209.00	.....	.....
Breeching and Smoke Flue	4–7	1,348.57	98.23	1,250.34	500.00	.....	848.57	135.00	.....	.....
Stack (self-supporting steel)	7	8,672.50	270.00	8,402.50	6,301.00	.....	2,371.50	270.00	.....	.....
Heaters and purifiers (2500 H. P. closed)	50 and total	2,395.00	403.00	1,992.00	996.00	.....	1,399.00	1,200.00	.....	.....
Pumps	5	1,816.00	80.70	1,735.30	371.57	.....	1,444.43	1,083.00	.....	.....
Compressed air system	5	255.00	18.75	236.25	141.75	.....	113.25	100.00	.....	.....
Engines (compound, Corliss)	3–4	49,941.37	2,499.09	47,442.28	13,728.00	396.00	36,609.37	29,100.00	.....	.....
Piping and covering	4	19,247.00	1,852.00	17,395.00	4,348.75	.....	14,898.25	4,567.00	.....	.....
Generators (2130 K. W)	3–5	44,020.00	5,800.00	38,220.00	14,036.00	7,000.00	36,984.00	20,156.00	.....	.....
Switchboard and general leads	3	9,490.00	772.00	8,718.00	2,615.00	.....	6,875.00	5,188.00	.....	.....
Miscellaneous	2–3	2,512.00	244.50	2,267.50	320.00	.....	2,192.00	1,500.00	.....	.....
Total	.....	$179,413.50	$13,332.27	$166,081.23	$59,128.87	$10,068.00	$130,352.63	$74,238.00	$6,745.86	.....
Engineering, organization and incidentals, 10 per cent	.....	17,941.35	1,333.23	16,608.12	5,912.88	1,006.80	13,035.27	7,423.80	.....	.....
Grand total	.....	$197,354.85	$14,665.50	$182,689.35	$65,041.75	$11,074.80	$143,387.90	$81,661.80	$6,745.86	$88,407.66
Cost new per connected K. W. (2130)	.....	.....	.....	.....	.....	.....	.....	.....	92.65	.....
Cost new per boiler horse power (2100)	.....	.....	.....	.....	.....	.....	.....	.....	93.97	.....
Present value per connected K. W. (2130)	.....	.....	.....	.....	.....	.....	.....	.....	67.32	.....
Present value per boiler horse power (2100)	.....	.....	.....	.....	.....	.....	.....	.....	68.28	.....

Union Electric Light and Power Company, St. Louis, Mo.—In 1911 the Municipal Public Service Commission of St. Louis issued an order reducing the rates of the local lighting Company, said order being based on a valuation of the Company's property. The Company submitted an appraisal made up by their engineers, aggregating slightly over $24,000,000 (see Table VII) which the Commission analyzed and verified through making a valuation with its own engineers. The results of the Commission's appraisal showed a valuation of slightly over $16,000,000 (see Table XXVIII) including an allowance of $1,000,000 for "Cost of Establishing Business" and $80,000, the capitalization, at 8 per cent. of pole rent saved. The valuations submitted by the engineers of the Company and the Commission, as well as a comparison of their figures of net plant cost (see Table IX) and a typical detail sheet (see Table XX) relating to the miscellaneous physical property, are shown on the following pages.

The Commission made up its estimate of value on the basis of expenditures by the Company, disregarding the latter's claim that its estimated cost of reproduction new should be the value adopted. Using the actual expenditures of the Company to establish its unit prices, the Commission held that there should be no allowance for a general contractor's profit, allowing however, 5 per cent. for engineering, 5 per cent. for contingencies in addition to "some special percentages for contingency" allowed on certain items. Interest during construction, at the rate of 6 per cent., was allowed to the amount of $725,780 as well as taxes and insurance during construction. The Company's engineers offered tabulations showing the "going value" or "continuous-property value" of the investment in accordance with the practice of the Railroad Commission of Wisconsin, but the Commission refused the allowance of any such value holding that a deficit properly allowed in capitalization, as the cost of establishing a business, should be limited to a reasonable time at the beginning of a new business and that for rate making purposes, going value was identical with the cost of establishing the business. It recognized that there are certain expenses of organization proper for capitalization, but held that expenses preliminary to the organization of a corporation in prospecting the field and interesting stockholders and promoter's profits were not, under the laws of the state, proper items for consideration. Real estate at its present value was allowed. Discount on bonds

was not considered proper for capitalization but only to "be treated as interest to be paid out of the fair rate of return allowed on the earning value of the property." No franchise values were recognized because they "were given free by the public. They cannot then, with justice, be valued against the public in establishing the rates." In determining present value, the Commission considered only actual, accrued depreciation and did not make deductions for theoretical depreciation holding that such estimates "are extremely problematical and these elements should not be generally taken into account in determining present value."

TABLE VII

SUMMARY

ESTIMATED COST OF REPRODUCTION NEW AS EXISTING OF THE PROPERTY OF THE UNION ELECTRIC LIGHT AND POWER COMPANY, SAINT LOUIS, MISSOURI, AS OF OCTOBER 31, 1909, AS PRESENTED BY THE COMPANY

	Item	Total
I. DEVELOPMENT:		
1. Development Period (Obtaining Rights and Capital).		
a. Time and Expense of Development Organization (3 per cent. of Item II)	$724,365	
b. Interest on Expenditures during Development Period (Computed)	138,355	$862,720
II. CONSTRUCTION:		
1. Time and Expense of Permanent Organization (Inventory priced)		428,905
2. Cost of Reproducing Real Estate (Appraisal by Zeibig and Benoist)		3,449,220
3. Cost of Construction and Equipment based partly on Labor and Material and partly on Sub-contracts:		
a. Building and Improvements (Inventory priced)	$2,787,343	
b. Piping (Inventory priced)	335,825	
c. Power Plant equipment (Inventory priced)	3,365,535	
d. Sub-station equipment (Inventory priced)	661,757	
e. Switchboards (Inventory priced)	332,596	
f. Series arc apparatus (Inventory priced)	61,234	
g. Storage batteries (Inventory priced)	259,061	
h. Distribution system—underground (Inventory priced)	2,869,323	

COSTRUCTION (Cont'd.)	Item	Total
i. Distribution system—overhead (Inventory priced)	1,471,624	
j. Transformers (Inventory priced)	182,534	
k. Meters (Inventory priced)	361,711	
l. Arc lamps (Inventory priced)	116,521	
m. Nernst lamps (Inventory priced)	45,163	
n. Motors (Inventory priced)	19,288	
o. Isolated plants (Inventory priced)	30,969	
p. Steam heat lines (Inventory priced)	12,650	
q. Teams, wagons and automobiles (Inventory priced)	45,589	
r. Tools (Inventory priced)	32,724	
s. Furniture and fixtures (Inventory priced)	44,938	
t. Incidentals and contingencies (5 per cent. of Items 3 *h–s*)	253,308	13,289,693
4. General Contractor—Overhead Charges and Profit (10 per cent. of Item 3)		1,328,969
5. Cost of Engineering (5 per cent. of Items 3–4)		730,933
6. Interest on Construction Expenditures (Computed)		2,490,749
7. Taxes and Insurance on Construction (Computed)		276,365
8. Working Capital:		
a. Stores and supplies (Actual per records)	$391,246	
b. Cash or equivalent (Actual as per Auditor)	484,578	
c. Incidentals (10 per cent. of Item 8*a*)	39,124	914,948
9. Edison Licensee Agreement (Estimated)		200,000
10. Kinloch Pole Right Agreement (Estimated)		100,000
Total Cost of Reproduction as of October 31, 1909 (subject to exceptions noted below)		$24,072,502

Note.—The above estimate does not include any:

(*a*) "Going concern" value, of the character recognized by authoritative decisions.

(*b*) Profits of promotion.

(*c*) Discounts and commissions on securities.

(*d*) Special value of existing franchises.

(*e*) Assets not included in estimated cost of reproduction.

(*f*) Net investment in superseded property.

TABLE XXVIII

ESTIMATED EARNING VALUE OF TOTAL PRESENT PROPERTY

P. S. C.

I. ORGANIZATION:	
1. Expense of Organization	$ 125,500
2. Interest on Organization Expense	32,944
II. CONSTRUCTION:	
1. Cost of Real Estate	800,000
2. Cost of Construction	12,586,741
3. Cost of Engineering	629,337
4. Interest on Construction Expenditure	725,780
5. Taxes and Insurance during Construction	130,203
III. WORKING CAPITAL	865,520
IV. KINLOCH POLE CONTRACT	80,000
V. ALLOWANCE FOR COST OF ESTABLISHING BUSINESS	1,000,000
	$16,976,025
Deduct Depreciation for Present Condition	841,632
	$16,134,393

TABLE IX

SUMMARY OF ESTIMATE OF CONSTRUCTION COST

	P. S. C. estimated cost	Company's estimated cost	Difference per cent.
1 Ashley St. Plant	$ 5,131,378.71	$5,315,667.00	3.59
2. Lewis St. Plant	654,309.38	683,674.00	4.39
3. Sub-station No. 3 and 10th St.	677,854.97	704,597.00	3.95
4. Sub-station No. 1	202,959.63	211,884.00	4.39
5. Sub-station No. 2	209,020.90	217,680.00	4.14
6. Sta. A and B, Sub-station No. 4	290,555.68	382,002.00	31.48
7. Sub-station No. 5	230,016.41	243,143.00	5.76
8. Sub-station No. 7	28,832.75	41,538.00	44.06
9. Overhead System	1,413,368.97	1,545,205.41	9.33
10. Underground System	2,870,150.18	3,013,789.61	5.005
11. Misc. Physical Properties	878,293.80	932,066.00	6.12
Total	$12,586,741.38	$13,290,646.02[1]	5.51

[1] Discrepancy between this total and Company's total, "Cost of Construction" as shown in Table VII, is due to a mistake in addition by Company, in summing up the items in the Underground System Table XIX.

TABLE XX

MISCELLANEOUS PHYSICAL PROPERTY

P. S. C. Estimate of Construction Cost

	P. S. C. estimated cost	Company's estimated cost	Difference per cent.
1. Building, 212 Gratiot St.	$ 3,766.00	$ 3,766.00	.....
2. Isolated Plants	30,969.00[1]	43,619.00	.....
3. Arc Lamps	109,084.00	116,521.00	.....
4. Nernst Lamps	44,818.00	43,163.00	.....
5. Motors and Fans	13,243.00	19,288.00	.....
6. Transformers	183,411.00	182,534.00	.....
7. Meters	356,360.00	361,711.00	.....
8. Teams, Wagons and Automobiles	45,589.00	45,589.00	.....
9. Furniture	42,131.00	44,938.00	.....
10. Station Tools	Inc. in Plants[2]	.....	.....
11. Distribution Tools	13,577.00	32,724.00	.....
Incidentals and Contingencies 5 per cent. of Distribution System, Items 3, 4, 5, 6, 7.	35,345.80	36,213.00	.....
Total	$878,293.80	$932,066.00	6.12

[1] Heating pipe work from 10th St. Plant contained in 10th St. pipe work.
[2] Station Tools $19,146.32 Included in Plants.

Macon Gas Light and Water Company, Georgia.—In 1910 the City of Macon, Georgia, having decided to purchase the Water Works plant of the Macon Gas, Light and Water Company, appointed two local bankers, Messrs. E. W. Stetson and O. E. Dooly, as members of an Arbitration Board of seven, to which two engineers were appointed by the Water Company, Messrs. N. Wingfield, and A. W. McCallum; these four appointed three disinterested hydraulic engineers, Messrs. John W. Alvord, George G. Earl and Leonard Metcalf. Under the terms of an agreement between the City and the Water Company, the gentlemen appointed constituted a Valuation Committee as well as a Board of Arbitration which was able to determine its own method of procedure. As several members of the Board were thoroughly familiar with water works valuation proceedings, in order to save time the Board concluded to conduct business hearings, in the main without assistance of counsel. The evidence was put in as directly and as simply as possible, opportunity then being given to counsel of the City and the Company to recall and cross-examine witnesses and to make closing arguments upon the evidence adduced. This method of procedure, while

unique and somewhat arbitrary, met with the hearty approval and co-operation of counsel and representatives both for the City and Company, the Board being able to conclude its deliberations and render its decision within two weeks, at an expense, for the cost of the proceedings, said to be less than 3 per cent. of the amount of the final award. This satisfactory result is in marked contrast to the frequent expense of such proceedings which often runs to from 10 to 15 per cent. of the final award.

Without attempting to reproduce all the data submitted, in the following pages are shown, through the courtesy of Mr. Metcalf, a summary, prepared by one of the members of the Board, from the evidence submitted and from certain computations made in collaboration with other members, on which the Board based its final decision.

In connection with the valuation finally determined upon by the Board, it should be stated that although a majority opinion favored a slightly higher award, which might have resulted but with a divided report, the unanimous agreement to the final figure was had because of an expressed preference on the part of the Water Company to accept a slightly lower award with a unanimous report.

The case as a whole is an unusually interesting and instructive one by reason of the personnel of the Board, the methods adopted in obtaining a quick and undivided report, the consideration given the various elements prescribed by the Supreme Court as proper for determining "fair value", the allowance of 12 1/2 per cent. on all costs of physical property, including real estate, for engineering and incidentals, the deduction of theoretical depreciation only, and finally the allowance for franchise and going value. The chart (Fig. 8) indicating the method of figuring and determining going value is referred to and the method discussed under the head of "Going Value" in the preceding pages of this book.

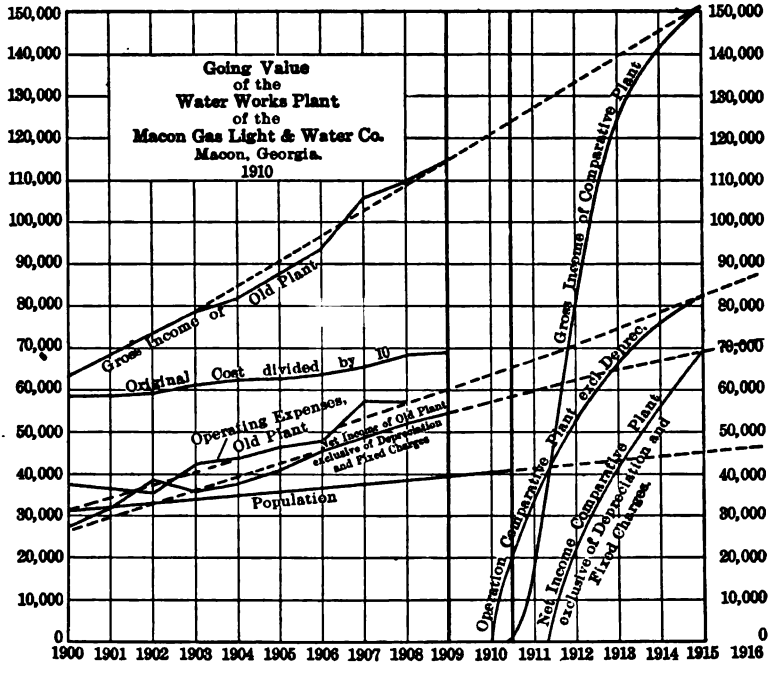

Going Value
of the
Water Works Plant
of the
Macon Gas Light & Water Co.
Macon, Georgia.
1910
Gross Income of Old Plant
Original Cost divided by 10
Operating Expenses, Old Plant
Net Income of Old Plant exclusive of Depreciation and Fixed Charges
Population
Gross Income of Comparative Plant
Operation Comparative Plant exclusive of Depreciation and Fixed Charges
Net Income Comparative Plant exclusive of Depreciation and Fixed Charges
150,000
140,000
130,000
120,000
110,000
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1900 1901 1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916

FIG. 8.

MACON GAS, LIGHT AND WATER CO.

WATER WORKS GENERAL STATISTICS

Information obtained Nov. 23, 1910, by Arbitration Board

Year ending Dec. 31	1905	1906	1907	1908	1909	1910
Population on area served	35,827	36,794	37,761	38,728	39,695	40,662
Pumping entire supply into high service letting 3/4 back into low service.						
Miles of pipe, all kinds	39.2	41.6	43.7	47.1	48.2	.....
Miles of C. I. pipe only	36.6	38.6	40.5	43.6	44.0	.....
Pop. per mi. of pipe	915	885	865	882	824	.....
Range of sizes, inches diam. 1"–20" inclusive.	.....	.....	.....	.....	.....	.....
Per cent. wroughtiron	6.4%	7.0%	7.1%	7.4%	8.7%	.....
Taps in service—live—1900–2570	3,144	3,275	3,456	3,656	3,927	.....
Per 1000 popul.	88	89	91	94	99	.....
Per mile of pipe	80	79	79	78	82	.....
Persons per tap	11.4	11.2	10.9	10.6	10.1	.....
Meters	636	689	740	821	990	.....
Per cent. of taps metered	20.2%	21.0%	21.4%	22.5%	25.2%	.....
Consump. annual m. g.—1900–997	1,237	1,201	1,384	1,343	1,414	.....
Daily, gpd	3,390,000	3,290,000	3,790,000	3,670,000	3,870,000	.....
Per capita, gpd	94	90	101	95	98	.....
Per mile of pipe, gpd	86,500	79,100	86,700	77,900	80,300	.....
Per tap, gpd	1,078	1,004	1,096	1,003	985	.....
Pressure (range) 40 to 130 lbs	.....	.....	.....	.....	.....	.....
Hydrants—number (public only)	218	234	239	248	268	275
Per 1000 popul.	6.1	6.4	6.3	6.4	6.7	.....
Per mile of pipe	5.6–	5.6	5.5	5.3	5.6	.....
Gross income, total	$87,199	$93,265	$105,990	$109,185	$114,893	.....
Per capita	2.43	2.54	2.80	2.82	2.90	.....
Per mile of pipe	2,230–	2,240	2,430	2,320	2,380	.....
Per tap	27.72	28.49	30.68	29.84	29.28	.....
Per m.g. consump.	70.50	77.70	76.60	81.30	81.30	.....
Gross inc. excl. hyd. rentals	76,291	81,783	94,062	97,117	102,003	.....
Per capita	2.13	2.22	2.49	2.51	2.57	.....
Per mile of pipe	1,950–	1,970	2,150	2,060	2,120	.....
Per tap	24.27	24.98	27.20	26.56	25.98	.....
Per mil. gals	61.70	68.10	68.00	72.30	72.10	.....
Cost of oper. excl. fxd. chgs. and deprec.	46,287	47,882	57,680	57,062	60,319	.....
Per capita	1.29	1.30	1.53	1.47	1.52	.....
Per mile of pipe	1,180–	1,150	1,320	1,210	1,250	.....
Per tap	14.71	14.62	16.70	15.62	15.36	.....
Per mil. gals	37.42	39.90	41.70	42.50	42.70	.....
Per cent. of gross income	53.0%	51.4%	54.4%	52.3%	52.5%	.....
Net inc. excl. fxd. chgs. and deprec.	$40,913	$45,383	$48,310	$52,123	$54,575	.....
Per capita	1.14	1.23	1.28	1.35	1.38	.....
Per mile of pipe	1,040+	1,090	1,110	1,110	1,130	.....
Per tap	13.01	13.86	13.98	14.26	13.90	.....
Per mil. gals	33.07	37.80	34.90	38.80	38.60	.....
Per cent. of gross	47.0%	48.7%	45.6%	47.8%	47.5%	.....
Hydrant rental, total	$8,625	$9,201	$9,401	$9,514	$10,250	.....
Per hydrant	39.56	39.38	39.35	38.35	38.22	.....
Per mile of pipe	220	222	216	218	213	.....
Taxes, annual (included above)	7,124	6,195	7,153	8,457	9,598	.....
Per cent. of gross income	8.2%	6.2%	6.8%	7.7%	8.3%	.....

Bonds,
Rate of interest,
Capital stock,
Floating debt,
} Securities cover gas works as well as water works.

Actual cost, $689,107; value, $699,000, as of Dec. 2, 1910.

Water rates, 1st faucet, $6.00; bath, $5.00; closet, $5.00; meter rates, 25¢–6¢.

MACON GAS, LIGHT AND WATER CO.

WATER WORKS INCOME AND OPERATION

Nov. 23, 1910. Earnings and Expenses, 1905–1909, Inclusive

Gross income	1905	1906	1907	1908	1909
Flat rates, domestic	$40,705	$42,934	$46,176	$50,173	$47,887
Flat rates, private fire protection	3,037	3,006	3,357	4,520	4,759
Meter rates, domestic	17,256	18,896	22,318	23,805	30,833
Meter rates, manufacturers and railroad	15,548	17,169	22,491	19,773	20,608
Meter rates, elevators	1,160	1,160	1,132	1,054	718
City of Macon, hydrants	8,625	9,201	9,401	9,514	10,250
Flushing sewers	1,058	1,109	1,134	1,143	1,180
Other uses	1,226	1,171	1,392	1,411	1,460
Total	$88,614	$94,646	$107,402	$111,393	$117,696
Deduct allowances, rebates	1,414	1,381	1,412	2,208	2,803
Gross income	87,199	93,265	105,990	109,185	114,893
Operating expenses (as below)	46,287	47,882	57,680	57,062	60,319
Net income excl. inter. and deprec	$40,913	$45,383	$48,310	$52,123	$54,575

Detailed Statement of Operating Expenses Shown Above

Pumping and filtering:					
Station, labor	$5,254	$5,760	$6,486	$6,419	6,356
Fuel	11,536	12,995	16,166	13,002	12,500
Alum	2,290	1,949	1,897	2,194	2,791
Supplies and expenses	1,191	1,482	1,492	1,853	1,666
Station, repairs	1,243	2,797	2,627	1,741	1,374
Total	21,516	24,983	28,669	25,209	24,687
Distribution system	4,324	3,788	5,680	7,320	7,678
Admin. and general:					
Salaries	6,972	7,280	8,526	9,480	9,094
Office and general	5,098	4,159	4,286	4,793	5,412
Miscellaneous	1,149	1,401	3,217	1,704	3,812
Stable, Travel, Legal, Ins., Soliciting, Real Est., Engr.					
Total	13,219	12,840	16,029	15,977	18,318
Bad debts	103	76	150	99	37
Taxes	7,124	6,195	7,153	8,457	9,589
Total operating expenses, exclusive depreciation and fixed charges.	46,287	47,882	57,680	57,062	60,319

MACON GAS, LIGHT AND WATER CO.

WATER WORKS

Summary of Earnings and Expenses for Five Years from 1905 to 1909, Inclusive

	1905	1906	1907	1908	1909	5 year ave. amount	Per cent. of gross income
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gross earnings:							
Flat rates:							
Domestic	$40,705	$42,934	$46,176	$50,173	$47,887	$45,575	44.7
Private hydrants and automatic sprinklers	3,037	3,005	3,356	4,520	4,758	3,735	3.7
Meter rates:							
Domestic	17,255	18,895	22,317	23,804	30,832	22,620	22.2
Manufacturers and railroads	15,547	17,168	22,491	19,772	20,608	19,117	18.7
Elevators	1,159	1,159	1,132	1,054	718	1,044	1.0
City of Macon:							
Hydrants	8,624	9,201	9,401	9,513	10,250	9,397	9.2
Flushing sewers	1,057	1,108	1,134	1,143	1,180	1,124	1.1
Other purposes	1,225	1,171	1,392	1,411	1,460	1,331	1.3
	$88,613	$94,646	$107,401	$111,393	$117,695	$103,949	101.9
Less allowances and rebates	1,414	1,381	1,411	2,208	2,802	1,843	1.9
Total gross earnings	$87,199	$93,265	$105,989	$109,185	$114,893	$102,106	100.
Operating expenses, as annexed	46,286	47,882	57,680	57,061	60,318	53,845	52.8
Net earnings, exclusive of interest and allowance for depreciation,	$40,912	$45,382	$48,309	$52,123	$54,574	$48,260	47.2

MACON GAS, LIGHT AND WATER COMPANY

WATER WORKS

Summary of Operating Expenses, Exclusive of Interest on Funded and Floating Debt and Allowance for Depreciation

	1905	1906	1907	1908	1909	5 year ave. amount $	Per cent. of gross income
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pumping and Filtering.							
Station labor	$5,254	$5,760	$6,486	$6,419	$6,356	$6,055	5.9
Fuel	11,536	12,995	16,165	13,001	12,499	13,239	13.0
Alum	2,290	1,948	1,897	2,193	2,790	2,228	2.2
Supplies and expenses	1,191	1,481	1,492	1,853	1,666	1,536	1.5
Station repairs: Labor	356	372	505	581	509	464	0.5
Materials	886	2,424	2,122	1,159	865	1,491	1.5
	$21,516	$24,983	$28,668	$25,209	$24,686	$25,012	24.6
Distribution.							
Repairs mains: Labor	1,535	1,341	2,300	2,912	2,232	2,064	
Materials	314	202	1,002	613	421	510	
Repairs hydrants and valves: Labor	16	2	.....	30	6	13[1]	
Materials	22	51	45	2	5	25	
Repairs, reservoirs and stand pipes: Labor	16	.....	3	55	29	25[1]	
Materials	10	1	1	40	40	18	
Repairs, services: Labor	387	59	16	96	174	146	
Materials	44	179	32	200	81	107	

[1] Four year average.

MACON GAS, LIGHT AND WATER COMPANY

WATER WORKS—*Continued*

Summary of Operating Expenses, Exclusive of Interest on Funded and Floating Debt and Allowance for Depreciation

	1905	1906	1907	1908	1909	5 year ave. amount $	Per cent. of gross income
Repairs meters: Labor	85	29	6	65	52	47	
Materials	298	88	143	170	106	161	
Miscellaneous: Labor	1,454	1,547	1,890	2,473	2,862	2,045	
Materials	137	285	237	658	1,664	596	
	$4,324	$3,788	$5,679	$7,319	$7,677	$5,757	5.6
Management and general expenses.							
Salaries	6,971	7,279	8,525	9,480	9,094	8,269	8.1
Office and gen'l. expenses	5,097	4,159	4,286	4,792	5,412	4,749	4.7
Stable	439	467	682	.....	224	413[1]	0.4
Traveling	265	289	367	280	605	361	0.4
Real estate and miscellaneous	116	328	237	411	105	239	0.2
Legal	210	234	968	296	703	482	0.4
Insurance	20	20	20	12	12	16	
Soliciting new business	98	61	171	280	960	314	0.3
A. B. Boardman	.....	.....	770	422	1,200	799[2]	0.8
	$13,219	$12,839	$16,029	$15,976	$18,318	$15,276	15.0
Bad debts written off	103	75	149	98	37	92	
Taxes	7,123	6,195	7,152	8,457	9,598	7,705	7.6
Total operating expenses	$46,286	$47,882	$57,680	$57,061	$60,318	$53,845	52.8

[1] Four year average.
[2] Three year average.

MACON GAS, LIGHT AND WATER COMPANY

WATER WORKS DEPRECIATION ESTIMATE

Date Nov. 24–30, 1910. (Sinking Fund Method. Contributions at end of the year. Interest Compounded Annually at Variable Per Cent.)

Item	Reproduction cost $ Including 12½ per cent.[1]	Net physical value
Real Estate "A".		
1. 407 acres at Waterville Pumping Station vicinity	16,875	$16,875
2. 9 acres Waterville Pumping Station and Springs	5,062	5,062
3. 1 acre Troup Hill	2,812	2,812
4. 3 acres Wolfolk Hill	4,500	4,500
5. 25 acres Riverside	6,750	6,750
6. ¼ acre Vineville	1,687	1,687
7. Lot No. 10. ¼ acre	4,608	4,608
8. Chickamauga Sq	Title in city.	.....
Total Real Estate	$42,294	$42,294
Add water rights, etc., at Waterville	3,122	3,122
	$45,416	$45,416
Rights of Way "B".		
1. Force main—Thompson	$ 489	$ 489
2. Force main—Ocmulgee L. Co	2,544	2,544
3. 12" main—S. T. Collins	147	147
4. 12" main—E. E. Harris	98	98
Total rights of way	$3,278	$3,278

[1] Note. Interest during construction and organization, etc., excluded in the 12½ per cent. allowance.

MACON GAS, LIGHT AND WATER COMPANY

WATER WORKS DEPRECIATION ESTIMATE—*Continued*

Date Nov. 24, 1910. (Sinking Fund Method. Contributions at End of Year. Interest Compounded Annually at Variable Per Cent.)

Item	Reproduction cost $ Including 12½ per cent.	Date of construction	Est'd life in years	Annual depreciation			Age years	Total depreciation		Net physical value
				Per cent.	Amount			Factor % depr.	Amount	
					Rate per cent.	$				
Buildings, "C".										
1. Frame-pumpg. Sta. Waterville	$2,592	1881	36	1.58	3	41	29	71	$1,842	$750
2. Coatsville well-house	2,475	1881	70	0.48	2¾	12	29	21	520	1,955
3. Coatsville frame well-house	337	1881	35	1.58	3¼	5	29	75	253	84
4. Coatsville brick stack	1,025	1888	27	2.24	3½	23	22	75	769	256
5. Coatsville tin covered bldg	1,337	1883	30	2.02	3¼	27	27	85	1,136	201
6. Washington St. cottage	2,250	1883	35	1.58	3¼	36	27	66	1,485	765
7. Magnolia St. stable	844	1886	25	2.57	3½	22	24	94	793	51
8. Riverside pumpg. Sta.	6,952	1898	55	0.73	3	51	12	10	695	6,257
9. Riverside filter house	9,531	1898	45	1.08	3	103	12	15.5	1,478	8,053
10. Riverside suction house	6,360	1898	55	0.73	3	47	12	10	636	5,724
11. Riverside low service pump room	1,285	1903	50	0.89	3	11	7	7	90	1,195
12. Riverside brick stack	3,375	1898	60	0.67	2¾	23	12	9.5	320	3,055
	$38,363		Average	1.05	—	$401	Average	26.1 —	$10,017	$28,346

MACON GAS, LIGHT AND WATER COMPANY

WATER WORKS DEPRECIATION ESTIMATE—*Continued*

Item	Reproduction cost $ Including 12½ per cent.	Date of construction	Est'd life in years	Annual depreciation			Age years	Total depreciation		Net physical value
				Per cent.	Amount			Factor % depr.	Amount	
					Rate per cent.	$				
Reservoir "D."										
1. Low service	17,533	1881	80	0.40	2½	70	29	17	2,980	14,553
2. Chickamauga standpipe	6,338	1883	33	1.73	3½	110	27	73	4,625	1,713
3. Settling basins	17,145	1898	90	0.30	2½	51	12	4	686	16,459
4. Vineville standpipe	15,188	1900	40	1.33	3	202	10	15.5	2,355	12,833
5. Clear Water basin	1,357	1898	70	0.48	2⅞	7	12	6.5	88	1,269
	$57,561		Average	0.76	—	$440	Average	18.7 —	$10,734	$46,827
Machinery at Waterville "E."										
1. Two boilers 50 h. p. each	1,351	1881	31	1.92	3½	26	29	91	1,228	123
2. 75 h. p. boilers	1,013	1888	25	2.57	3½	27	22	83	856	157
3. Worthington Dx. 20″×14″×10″	1,125	1883	35	1.58	3½	18	27	66	742	383
4. Feed pump 4×3×6. 2 mgd	88	1883	35	1.58	3½	1	27	66	58	30
5. Miscellaneous piping	529	1883	35	1.58	3½	8	27	66	349	180
	$4,106		Average	1.95	—	$80	Average	78.8 —	$3,233	$873

MACON GAS, LIGHT AND WATER CO.

WATER WORKS DEPRECIATION ESTIMATE—*Continued*

Date Nov. 25, 1910. (Sinking Fund Method. Contributions at End of Year. Interest Compounded Annually at Variable Per Cent.)

Item	Reproduction cost including 12½ per cent.	Date of construction	Est'd life in years	Annual depreciation			Age years	Total depreciation		Net Physical value
				Per cent.	Amount			Factor Per cent. depr.	Amount	
					Per cent.	$				
Riverside Station "F"		1898					12			
1. 2-200 H. P. B. & W. boiler	$ 5,455	1898	35	1.58	3½	86	12	23	1,255	$ 4,200
2. 1-210 H. P. A. & R. Boiler	3,392	1905	35	1.58	3½	54	5	8	271	3,121
Gage										
Regulator										
Cocks										
3. 500 H. P. heater	274	1910	35	1.58	3½	4	0	0		274
4. Feed pump 5½x3½x5Dx	269	1898	25	2.57	3½	7	12	38	102	167
5. Feed pump Dx 6x4x6	122	1907	25	2.57	3½	3	3	7	9	113
6. Feed water meter	132	1907	15	5.09	3½	7	3	17	22	110
7. Worthington triple 5mgd	12,938	1898	35	1.58	3½	205	12	23	2,976	9,962
8. R. W. Wood, ½ mgd	14,400	1903	35	1.58	3½	228	7	12	1,729	12,671
9. Worthington, 1½ mgd	1,762	1881	35	1.58	3½	28	29	75	1,322	440
10. Miscellaneous	170	1881	35	1.58	3½	3	9	16	27	143
	$38,914		Average	1.61	—	$625	Average	19.8 —	$7,713	$31,201
Electric plan "G" 7 K. W. direct and engine	$1,125	1898	25	2.57	3½	29	12	38	$428	$697
Pump suction and discharges "H"	$1,584	1900	45	1.08	3	$17	10	13	$206	$1,378
Filtering plant "I":										
1. Worthington, D. X., 18½x12x10	964	1898	30	2.02	3½	20	12	30	289	675
Gage										
Light feed										
2. Filter plant	33,750	1904	30	2.02	3½	682	6	13	4,390	29,360
3. Pulsometer pump	555	1898	25	2.57	3½	14	12	38	211	344
	$35,269		Average	2.03	—	$716	Average	13.9 —	$4,890	$30,379

MACON GAS, LIGHT AND WATER CO.

WATER WORKS DEPRECIATION ESTIMATE—*Continued*

Date Nov. 26, 1910. Sinking Fund Method. Contributions at End of Year. Interest Compounded Annually at Variable Per Cent.

Item	Reproduction cost including 12½ per cent.	Date of construction	Est'd life in years	Annual depreciation			Age, years	Total depreciation		Net Physical value
				Per cent.	Amount			Factor Per cent. depr.	Amount	
					Per cent.	$				
Machinery "J":										
1. Worthington triple low-service.....										
5 mgd. 8x12x20x20x15.....										
Dx vacuum 5½x5½x5.....										
Dx vacuum 6x7½x6.....										
Gages.....										
Lubricators.....										
Suction 135'x20" pipe.....										
20" foot valve.....	$10,582	1903	35	1.58	3½	167	7	12	1,271	$ 9,311
24x20 flanged reducer.....										
6' 6" x20" pipe.....										
20" flanged elbow.....										
2–20" flanged gate.....										
1–20" flanged check valve										
Labor.....										

MACON GAS, LIGHT AND WATER CO.

WATER WORKS DEPRECIATION ESTIMATE—*Continued*

2. Worthington compd. vert. 5 mgd. 9x14x21x15 Air pump 4½x3x4 2 pres. gages 7" 1 pres. gage 5" Lubricator 1 qt. Detroit Steam trap 1 separator, 4" pipe 2–15"I–22' 4–12"I–22' 4–12"I–16' 7–6"I–18' 2–4"–18' 20" suction 16 1–20" foot valve 1–18" gate 1–18" check 1–20x18x18Y 1–18"fl. 90° 1–18" fl 1–6" 1–6" 2–6"x4" 2–4" valves quick open 2–4" elbows 40–4" Labor	10,010	1898	30	2.02	3½	202	12	29	2,905	7,105
	$20,592		Average	1.80	=	$369	Average	20.3 =	$4,176	$16,416

MACON GAS, LIGHT AND WATER CO.

WATER WORKS DEPRECIATION ESTIMATE—*Continued*

Date Nov. 26, 1910. Sinking Fund Method. Contributions at End of Year. Interest Compounded Annually at Variable Per Cent.

Item	Reproduction cost including 12½ per cent.	Date of construction	Est'd life in years	Annual depreciation			Age, years	Total depreciation		Net physical value
				Per cent.	Amount			Factor Per cent. depr.	Amount	
					Per cent.	$				
"K" Riverside Station steam, water and exhaust pipe lines.	$1,554 Aver.	1900	35	1.58	3½	25	10	18	280	$ 1,274
"L" Riverside Station, piping, etc., in grounds										
1. Intake crib in river	1,000	1898	40	1.33	3	13	12	19	190	810
2. Sundry piping, gates, drain pipes, etc	10,700 Aver.	1898	60	0.67	2⅝	72	12	10	1,070	9,630
	$11,700	.....	.....	0.73	—	85	Average	10.8	1,260	10,440
"M" Waterville piping:										
1. Cast iron pipe	$8,100 Aver.	1890	70	0.48	2⅝	39	19	12	973	7,127
2. Clay pipe conductors	5,385 Aver.	1888	25	2.57	3½	138	22	83	4,470	915
3. 60 springs developed and com	1,462 Aver.	1888	30	2.02	3½	30	22	64	936	526
4. 5,853 ft. long road	3,375	1892	70	0.48	2⅝	16	18	11	371	3,004
5. Water rights at Waterville and White Bluffs 1½ mgd	Included as item	A No. 9	under re	al estate.						
	$18,322	.....	.....	1.22	—	223	.....	36.8	6,750	11,572

MACON GAS, LIGHT AND WATER CO.

WATER WORKS DEPRECIATION ESTIMATE—*Continued*

Item	Reproduction cost including 12½ per cent.	Date of construction	Est'd life in years	Annual depreciation			Age, years	Total depreciation		Net Physical value
				Per cent.	Amount			Factor Per cent. depr.	Amount	
					Per cent.	$				
"N" Railway siding and coal shute.....	$2,250	1898	35	1.58	3½	36	12	23	517	1,735
"O" Distributing Pipe System.										
1. 21,741–20" $3.05 including C. I. Pipe @ $25 per 2000 lbs.....	$74,599 Aver.	1897	80	0.40	2½	298	13	6	4,476	70,123
2. 7,948–14" @ 1.96.....	17,525 Aver.	1890	80	0.40	2½	70	22	12	2,103	15,422
3. 27,616–12" @ 1.56.....	48,466 Aver.	1902	80	0.40	2½	194	8	4	1,939	46,527
4. 17,520–10" @ 1.08.....	21,286 Aver.	1891	80	0.40	2½	85	19	10	2,129	19,157
5. 12,218– 8" @ 0.84.....	11,546 Aver.	1887	80	0.40	2½	46	23	12.5	1,443	10.103
6. 109,626– 6" @ 0.61.....	75,231 Aver.	1892	65	0.57	2⅝	429	18	13	9,780	65,451
7. 37,409– 4" @ 0.46.....	19,359 Aver.	1887	50	0.89	3	172	23	30	5,808	13,551
8. 2,794– 3" @ 0.38.....	1,195 Aver.	1890	40	1.33	3	16	20	36	430	765
236,872 ft. =44.8 Miles.....	$269,207	1894	73	0.54	=	$1,310	16 A	v.11.5=	$28,108	$241,099
9. 21,770'–2"W. 1 @ 22¢.....	$5,388 Aver.	1903	25	2.57	3½	139	7	20	1,078	4,310
10. 1,095'–1½" @ 16¢.....	175 Aver.	1900	25	2.57	3½	5	10	31	54	121
1,303'–1¼" @ 14¢.....	182 Aver.	1900	25	2.57	3½	5	10	31	56	126
1,590'–1" @ 12¢.....	191 Aver.	1900	25	2.57	3½	5	10	31	59	132
25,758 ft. =4.88 Miles.....	$5,936			2.57	=	$154	7	Av. 21	$1,247	$4,689
11. 235 tons Specials.....	12,263 Aver.	1894	75	0.41	2⅝	50	16	8	981	11,282
Pavement @ $2.50—7,917 sq. yds...	22,266 Aver.	1889	75	0.41	2⅝	91	21	22	4,899	17,367

MACON GAS, LIGHT AND WATER CO.

WATER WORKS DEPRECIATION ESTIMATE—*Continued*

Date Nov. 26, 1910. Sinking Fund Method. Contributions at End of Year. Interest Compounded Annually at Variable Per cent.

Item	Reproduction Cost including 12½ Per cent.	Date of construction	Est'd life in years	Annual depreciation			Age years	Total depreciation		Net physical value
				Per cent.	Amount			Factor % depr.	Amount	
					Per cent.	$				
"O" continued.										
12. Valves	9,700	.....	45	1.08	3	105	16	22	2,130	7,570
13. Hydrants	8,044	.....	45	1.08	3	87	18	25	2,011	6,033
14. 165 flush tank com	1,856	.....	25	2.57	3½	48	12	38	706	1,150
15. 22 fountains	1,011	.....	40	1.33	3	13	16	27	273	738
16. Services	16,680	.....	25	2.57	3½	429	12	38	6,328	10,352
Services	8,037	.....	60	0.67	2¾	54	16	13	1,044	6,993
	$45,328	.....	Average	1.62%	—	736	Average	27.6%	12,492	32,836
Total item "O"	$355,000	.....	Average	0.66%	—	2,341	Average	13.5%	$47,727	$307,273
"P" water meters by Co	$1,214	.....	25	2.57	3½	$31	7	20%	$243	$971
"Q" organization incorporation, etc	15,000	.....	.....	.....	.....	.....	.....	.....	.....	15,000
"R" interest during construction	19,000	.....	.....	0.86%	.....	163	.....	15.5	2,946	16,054
"S" going value and good will	120,000	.....	.....	.....	.....	.....	.....	.....	.....	120,000
"T" franchise value, etc	9,872	.....	.....	.....	.....	.....	.....	.....	.....	9,872

"U" stock on hand—not included.—To be adjusted on date of transfer of property at current market prices.

For totals see "Summary".

MACON GAS, LIGHT AND WATER CO.

WATER WORKS DEPRECIATION ESTIMATE—*Concluded*

Item	Reproduction cost including 12½ per cent.	Annual depreciation		Total depreciation		Net physical value
		%	Amount	Factor	Amount	
"A." Real estate	$ 45,416	.....	.....	.....	.....	$ 45,416
"B." Rights of way	3,278	.....	.....	.....	.....	3,278
"C." Buildings	38,363	.....	$401	.....	$10,017	28,346
"D." Reservoir	57,561	.....	440	.....	10,734	46,827
"E." Machinery, Waterville	4,106	.....	80	.....	3,233	873
"F." Riverside Station	38,914	.....	625	.....	7,713	31,201
"G." Electric plant	1,125	.....	29	.....	428	697
"H." Pump suction, etc	1,584	.....	17	.....	206	1,378
"I." Filter plant	35,269	.....	716	.....	4,890	30,379
"J." Machinery	20,592	.....	369	.....	4,176	16,416
"K." Riverside Station piping	1,554	.....	25	.....	280	1,274
"L." Riverside Station piping	11,700	.....	85	.....	1,260	10,440
"M." Waterville Springs	18,322	.....	223	.....	6,750	11,572
"N." Railway siding	2,250	.....	36	.....	517	1,733
"O." Distributing pipe, etc	355,000	.....	2,341	.....	47,727	307,273
"P." Water Meters	1,214	.....	31	.....	243	971
Total items "A" to "P"	$636,248	0.85% =	5,418	15.4% =	98,174	538,074
"Q." Organisation, incorporation, etc.	15,000	.....	.....	.....	.....	15,000
"R." Interest during construction	19,000	.....	163	.....	2,946	16,054
Total items "A" to "R"	670,248	.....	5,581	.....	101,120	569,128
"S." Going value	120,000	.....	.....	.....	.....	120,000
"T." Franchise and other rights	9,872	.....	.....	.....	.....	9,872
"U." Inventory of stock on hand excluded. To be adjusted on transfer of property.	.....	.....	.....	.....	.....	.....
Grand total	.....	.....	.....	.....	.....	699,000

Price fixed by Board of Arbitrators for "rights, appurtenances, franchises and good will, exclusive of stock on hand, $699,000.

MACON GAS, LIGHT AND WATER CO.

WATER WORKS STATISTICS, REPRODUCTION COST

Year ending Dec. 1, 1910.
Population U. S. Gov't., 1910 = 40,662.
Total Pipe, 48.2 miles. Range of Diameters, inches 1″–20″.
Rated Capacity, 10. Mgd. Average Consumption, 3.87 Mgd.
Mgd. = Million Gallons Daily.
Reproduction Cost, including 12 1/2 per cent. Engineering and Contingencies.

Reproduction Cost, Including 12½ Per Cent. Engineering and Contingencies

	Amount	$ Per mile pipe	$ Per mgd.	items % of 1 up to 12	items % of grand total	Supply pipe system Miles	Dia.
1 Intake	$14,985	$622	.....	2.2	1.9	.....	.....
2 Supply pipes or conduits	75,746	.....	.....	11.3	9.5	.....	.....
3 Pumping plant, at Tufts Springs, Waterville Sta.	30,194	.....	.....	4.5	3.8	.....	.....
Pumping plant, at Ocmulgee River, Riverside Sta	76,346	.....	.....	11.4	9.5	Distribution pipe system	
						Miles	Dia.
4 Reservoirs, Low-service, 2 1/4 mg.	17,533	.....	.....	2.6	2.2	.....	.....
Reservoirs, Chickamauga, 0.072 mg.	6,338	.....	.....	0.9	0.8	.....	.....
Reservoirs, Vineville, 0.883 mg.	15,188	.....	.....	2.3	1.9	.....	.....
5 Distribution pipe system[1]	251,670	.....	.....	37.5	31.4	%	24″
Meters	1,214	.....	.....	0.1	0.0	4.12 – 9.2	20″
6 Services or taps	24,717	.....	.....	3.7	3.1	.....	16″
Flush, tanks and fountain	2,867	.....	.....	0.4	0.4	1.50 – 3.3	14″
7 Filter plant[2]	67,662	.....	.....	10.2	8.5	5.23 – 11.6	12″
						3.32 – 7.4	10″
8 Real estate and rights of way	48,694	.....	.....	7.3	6.1	2.32 – 5.2	8″
Washington St. property	3,094	.....	.....	0.5	0.4	20.78 – 46.4	6″
9 Inventory, Supplies, etc	Excluded	.....	.....	.....	.....	7.09 – 15.7	4″
To be adjusted after purchase	.....	.....	.....	.....	.....	0.53 – 1.2	3″
10 Organization, incorporation, etc.	15,000	.....	.....	2.2	1.9	44.89 – 100	
11 Interest during construction	19,000	.....	.....	2.8	2.4	.....	.....
				99.9			
12 Going value	120,000	.....	.....	.....	15.0	.....	.....
13 Franchise and other values	9,782	.....	.....	.....	1.2	.....	.....
					99.9		
Grand total	$800,120	Less accrued depreciation =				$699,000	

Reproduction Cost, Including 12½ Per Cent. Engineering and Contingencies—*Continued*

	Amount	$ Per mile pipe	$ Per mgd.	
[15]a C. I. pipe at $25 = per net ton	$165,938	$3,440	.....	Net tons C. I. pipe, 6700. Tons per mile, 148.5.
b Pipe, wrot. iron, galv	5,936	123	.....	
c Specials 470,000 lbs at 2.61¢	12,263	255	.....	Lbs. per mile 10,420. 35.1% of weight;
Hydrants	8,044	167	.....	4.56% of cost of pipe.
d Valves	9,700	201	.....	7.6% of cost of pipe.
e Laying and miscellaneous	103,269	2,142	.....	
f Rock, c. y. at $	.....	.....	.....	
g Pavement	22,266	462	.....	
Total Item 5	$327,416	$6,790	.....	
[17]a Sedimentation tanks, 5 1/3 mgd.	17,145	.....	1,715	
b Filter beds, etc., complete 5 1/3 mgd.	33,750	.....	3,375	
c Clear water basins, 66,000 gals.	1,357	.....	136	
Pumps, $1,519; piping, $4,360	5,879	.....	588	
Buildings	9,531	.....	953	
Total Item 7	$67,662	.....	6,766	

FINAL AGREED VALUES:

Reproduction cost	$670,248
Less accrued depreciation	101,120
Net physical value	$569,128
Going value	120,000
Franchise, etc	9,872
Agreed value	$699,000

MACON GAS, LIGHT AND WATER CO.

SUMMARY

ORIGINAL COST, without allowance for cumulative loss of $207.786[1] (6 per cent. basis including depreciation)		$689,107
Including cumulative loss		896,893
REPRODUCTION COST, exclusive of going value	$667,126	
Going value	144,000	
	$811,126	
Less accrued depreciation	101,120	$710,006
WORTH OF SERVICE TO CONSUMERS:		
Reproduction cost less accrued depreciation excluding going value	$566,006	
Reasonable increment 25 per cent.	141,501	$707,507
COMMERCIAL ASPECT CAPITALIZATION:		
Nov., 1910. Net income	$57,000	
Deduct depreciation including 1/4 per cent. conting. depreciation	7,000	
	$50,000	
Capitalize $50,000 at 6 per cent. =		$833,000
Capitalize $50,000 at 7 per cent. =		714,000
Or since contract with city expires within two years:		
From net income less depreciation	$50,000	
Deduct 10 per cent. of domestic income for rate reduction for concession	7,700	
	$42,300	
Capitalize $42,300 at 6 per cent. =	704,000	
But as two years must elapse before revision		$715,000
Dec. 2, 1910 Report of Board of Arbitration, exclusive of stock on hand		$699,000

Note.—After final valuation the above figures were modified as follows:—Water rights at Waterville, $3,122, added to reproduction cost making the latter, $670,248. Depreciation kept at same figure. Going value cut to meet agreed value to $120,000. Franchise value set at $9,872 to meet agreed value of entire plant.

Hence:

Reproduction cost	$670,248	Net physical value	$569,128
Less accrued depreciation	101,120	Going value	120,000
		Franchise, etc	9,872
Net Physical value	$569,128		
		Total	$699,000

[1] Includes 10 per cent. contractors profit + 10 per cent. engineer and administrator.

Appraisal of Steam Railroads in Michigan.—Several appraisals of the steam railroads of Michigan have been completed under the direction of the State Legislature to "inquire into and ascertain the value of the property of corporations paying specific taxes under any of the laws of this State." The first appraisal was begun in 1900, Prof. Mortimer E. Cooley having been appointed in charge of the work. The number and magnitude of the railroad properties, the desire to complete the valuation in the shortest time possible and the general lack of information and rules of procedure for railway valuation made the task a novel and herculean one. The results accomplished, however, were so generally satisfactory, that although it was felt necessary to check and revise the work by a new valuation two years later, the methods adopted have largely resulted in furnishing an example which has been more or less followed in later appraisal work, particularly in Wisconsin and Minnesota. It was promptly recognized by Professor Cooley and the Board of Associate Engineers he collected about him, that it was necessary to include in the total value of the properties, not only that of the physical plants which could be "seen and felt," but also the value of properties which, while not visible, were equally a part of the plants, in addition to the intangible costs, always essential to the production of operating, going properties. Professor Henry C. Adams had charge of the evaluation of the purely non-physical part of the properties which included franchises; and what has come to be known as going values. Much of the work of Professor Adams was unique and his methods[1] have been more or less followed in some later appraisals. The values were worked out from a consideration of incomes and expenses, certain net returns being capitalized as giving the proper non-physical values desired, as explained in Chapter VII under "Franchises." These values were materially increased in the valuation of 1902 by a change in details and a decrease in the interest rate. The allowances used in the Michigan appraisal for engineering incidentals, interest during construction, etc., have been the object of wide interest and, as to their propriety, the subject of much controversy. The allowances made were as follows:

"*Engineering.*—This covered all the cost of preliminary and location surveys, design, and supervision of construction of the work, and

[1] Explained in Bulletin 21, U. S. Bureau of Census. Page 78.

all expenses connected therewith. This was covered by a charge of 4 per cent. of the cost of reproducing the permanent way and structure, but not the equipment.

Legal Expense.—This item is inseparable from the construction work, and was fixed at one-half of 1 per cent. of the cost of the same items as affected by the engineering charge.

Organization Expense.—This covered the cost of promotion, financing, and general supervision of construction, together with general office expense. These items were covered by an application of 1.5 per cent. of the cost of the above items.

Interest.—This item is intended to cover interest on money during the period of construction. The length of time taken to build would, of course, be variable. It was assumed that 3 per cent. on the entire cost of construction and equipment would be conservative, and this figure was used.

Discount on Bonds.—This was not included, for the reason that it was considered, not as a proper capital charge, but rather as an adjustment of the interest rate to the existing market condition, and as chargeable to interest account and not capital.

The Charge of 10 Per Cent. for Contingencies.—Perhaps no single feature of the Michigan appraisal of physical property has been so generally criticised as the charge of 10 per cent. of the entire estimated cost, including all percentage charges, to cover "contingencies."

The reasons for the allowance of 10 per cent. were:

> "(*a*) The conditions under which this particular inventory and appraisal were made, as to time and lack of co-operation of the companies, made it practically certain that some items of value were missed in the appraisal, such as station and miscellaneous equipment, frogs, switches, track structures, buildings owned by the companies and occupied by others, etc.
>
> (*b*) That there were many and large elements of physical cost not ascertainable by a physical inspection, such as deep foundations, many thousands of yards of earth in swamps and sink holes (a very general condition of roads in the Southern Peninsula), concealed classification due to growth of grass or washing of banks and many other cases of work actually done, invisible after a lapse of years.
>
> (*c*) The failure on the part of railroad companies to keep anything like a complete history of construction operations, and the changes of operating officials from year to year, caused the loss of record of practically all the expense due to extra hazard and risk which the construction engineer provides for by his "contingencies."
>
> (*d*) The inclusion in operating expense, every year, of sums which are properly construction, and which, if added to unit prices

of construction work, would cause the cry that such unit prices were too high. For instance, the appraisal estimate on earth was 17 cents per cubic yard with no allowance for overhaul. Very much of the grade in the State had actual cost far in excess of this figure and practically every road spends a large sum annually for the first four or five years, which is charged to operation but is in reality a part of the cost of completing the road bed.

(*e*) No account was taken of appreciation of any of the elements entering into a road. There is no doubt that road bed, for example, does appreciate, due to ballasting and track work. These items go far toward accounting for the contingency item on an old road such as the Michigan Central.

(*f*) There is a considerable amount of cost, which cannot be taken out of capital, where facilities are abandoned or line or grade changed. These changes are common to all growing roads; they are due to the demands for greater traffic; they are necessary to the welfare of the community served; they are often made at points where no charge of defective designs will apply. They might be termed expenses due to the development of the state, and, in the development of the railroad business, they were absolutely necessary for its present standard of efficiency. They are incapable of exact and definite determination and must of necessity be included as contingent expenses."[1]

The appraisal made in 1900 included values for real estate and right of way which were reached after much discussion and consideration of the subject. Subsequent investigation, in connection with the 1902 appraisal, including a thorough examination as to the prices actually paid for real estate, confirmed the opinion that the so-called "market prices" used in the earlier work were erroneous and misleading and resulted in a material increase for the values allowed in the work of 1902.

In estimating present value neither absolute nor theoretical depreciation was considered in connection with engineering, rights of way and real estate, grading, ballast, legal expenses, interest or organization expenses.

The results of the appraisal of 1900 are shown in the following table:

[1] "The Valuation of Public Service Property," H. E. Riggs, Transactions of the American Society of Civil Engineers, Volume LXXII, June, 1911.

TABLE 7.[1]—GRAND SUMMARY OF RAILROAD APPRAISAL OF 1900 AS TO SEVENTY-EIGHT INCORPORATION RAILROADS

Physical Appraisal

Item No.	Subject	Cost of reproduction	Present value
1	Engineering, 4 per cent. on items 2 to 25, inclusive, and on item 33.	$5,386,772	$5,386,772
2	Right of way and station grounds	27,745,313	27,745,313
3	Real Estate	863,337	863,337
4	Grading	21,699,995	21,693,024
5	Tunnels	1,148,070	1,093,445
6	Bridges, trestles, and culverts	8,027,119	6,337,819
7	Ties (cross- and switch-ties)	11,139,924	6,148,748
8	Rails	28,703,012	21,865,994
9	Track fastenings	3,845,030	2,987,982
10	Frogs, switches, and crossings	1,469,781	1,040,120
11	Ballast	3,723,558	3,723,558
12	Track laying and surfacing	6,555,638	6,400,972
13	Fencing	2,763,595	1,627,790
14	Crossings, cattle guards, and signs	607,542	428,474
15	Interlocking and signal apparatus	501,883	448,686
16	Telegraph (30) telephones	258,985	134,797
17	Station buildings and fixtures	4,108,736	3,111,103
18	Shops, round-houses and turn-tables	2,157,228	1,467,569
19	Shop machinery and tools	1,107,910	882,634
20	Water stations	725,670	522,135
21	Fuel stations	303,289	201,461
22	Grain elevators	1,336,794	1,609,043
23	Warehouses	258,646	183,910
24	Docks and wharves	5,531,919	3,831,934
25	Miscellaneous structures	1,234,345	856,253
26	Locomotives	9,021,517	5,092,053
27	Passenger equipment	3,197,473	2,277,271
28	Freight equipment	19,734,240	13,690,587
29	Miscellaneous equipment	702,940	423,689
31	Ferries and steamships	1,725,000	1,095,500
32	Electric plants	93,061	89,898
33	Terminals. Included in items 1–32		
34	Legal expenses, 0.5 per cent. on items 2–25, 33.	673,349	673,349
35	Interest, 3 per cent. on items 1–34	5,290,549	5,290,549
36	Miscellaneous expenses, organization, 1.5 per cent. Items 1–34.	2,645,277	2,645,277
	Contingencies, 10 per cent. items 1–34	18,428,759	15,127,110
	Total cost of construction and equipment.	$202,716,262	$166,398,156
37	Stores and supplies	1,474,829	1,474,829
	Average per main-line mile	28,263	23,495
	Average per total track mile	18,627	15,290
	Total value of non-physical element (H. C. Adams).		35,814,043

[1] "The Valuation of Public Service Property," H. E. Riggs, Transactions of the American Society of Civil Engineers, Volume LXXII, June, 1911.

Northern Pacific Railway, State of Washington.—The Railroad Commission of Washington has made appraisals of the larger part of the property belonging to the steam and electric railroads operating in that State. In its report on methods of procedure, the Commission says:

"Our engineers were, therefore, instructed to procure not only the original cost and the cost of duplication or reproduction, but, whenever possible, to procure in detail every unit quantity of labor and material entering into the construction of the road. This evidence was procured and introduced before the Commission, and the Commission, in making its findings, has not only ascertained the amount of money expended, the amount of money necessary to duplicate or reproduce the property, but, in addition thereto, has ascertained every unit quantity such as the number of cubic yards of earth, solid rock, hard pan, loose rock, cemented gravel and other grading quantities necessary to be moved, together with the necessary overhaul connected therewith, the number of tons of steel in the rails, the track fastenings, ties, iron and timber in bridges, the floor area of all buildings and every unit quantity entering into the construction. To these units current prices can at any time be applied and the cost of reproduction under the conditions then existing ascertained without any material expense, provided the Commission, from time to time, will have a further hearing to ascertain the nature of the improvements placed upon the property subsequent to the date of our findings and make supplementary findings of fact concerning the same."[1]

Mr. H. P. Gillette had practical charge for the Commission of the organization which collected the data, determined unit prices and submitted the values on which the Commission has based its decisions.

One of the most interesting and complete valuations made by this Commission is that of the property of the Northern Pacific Railway in the State of Washington which the Commission found aggregated 687.68 miles of main line and 941.75 miles of branches and spurs, a total of 1629.42 miles. The original cost of the property to the Railroad Company including improvements and betterments up to June 13, 1906, as determined by Mr. Gillette are given in Table I which is based on a mileage as found by him of 1645, being slightly in excess of the figure used by the Commission.

The cost of reproduction as estimated by Mr. Gillette and

[1] Second and Third Annual Reports of The Railroad Commission of Washington, page 129.

substantially accepted and adopted in its findings by the Commission, is given in Tables III and IV. The Commission found "the cash market value of the property on the thirtieth day of June, 1906" based on the cost of reproduction and not including real estate and equipment, to be $55,475,827.25. The value of the real estate used or necessary for the immediate future was found to be $32,862,872, a total for the entire property of $88,338,699.25. The Commission disregarded the 400 ft. right of way owned, and allowed only for a 100 ft. strip, as being all that was necessary.

Based on actual costs, which amounted to about 5 per cent., Mr. Gillette allowed 5 per cent. for engineering, in his estimated cost of reproduction. The Commission overruled this, however, and allowed only 3 1/2 per cent. for this item, the same as is uniformly used for all railroads in that State.

The cost of reproduction was found by ascertaining the original cost and adding from 15 to 20 per cent. to cover increased price of labor and material. Present or depreciated value was found by estimating theoretical depreciation at the rate of 3.6 per cent. per annum and deducting this amount from the cost of reproduction new. For further information regarding the method of determining depreciation, see Chapter VIII under "Fifty per cent. method."

The cost per mile of the Northern Pacific Railroad in Washington will be found high compared with many other roads, but this is due principally to the rugged character of the country which necessitated many tunnels and other similar expensive construction. The original cost shown in Table I discloses a particularly large amount for "interest and discount," but the Commission found that the Company, owing to the "pioneer work" done during its construction, had to pay high rates of interest and sell its securities at large discounts, in one instance bonds to the amount (par value) of $2,500,000.00 having been sold at 70 per cent. discount.

Some of the more important unit prices used were as follows:

Clearing, $100.00 per acre; grubbing, $22.00 per acre; earth excavation or embankment, 22 cents per yard; solid rock, $1.10 per yard; rip-rap, $1.10 per yard; slope wall, $2.50 per yard; timber cribs, $26.00 per thousand feet board measure; ties, 50 cents each; rails, $40.00 per ton; spikes, 2.08 cents per pound; bolts, 3.2 cents per pound; tie plates, 8 cents each; switches,

$80.00 each; ballast from $600.00 to $1000.00 per mile; track laying and surfacing (excluding train service), $700.00 per mile; passenger depots per square foot, frame $1.25, brick, $4.00; engine houses, frame 75 cents per square foot, brick $1500.00 per stall; machine shops and car houses, frame 50 cents per square foot, brick $2.90 per square foot; section houses, $1.25 per square foot.[1]

TABLE I.[1] ORIGINAL COST OF THE NORTHERN PACIFIC RAILWAY IN WASHINGTON PLUS IMPROVEMENTS
(1645 Miles of Line)

	Total	Per mile of line
1. Engineering	$ 2,907,344.26	$ 1,768
2. Right of way	1,796,272.00	1,092
3. Real estate	1,360,895.38	827
4. Clearing and grubbing	1,213,770.19	738
5. Grading	15,589,712.88	9,479
6. Tunnels	974,519.99	590
7. Bridges, trestles and culverts	7,879,328.94	4,790
8. Masonry	156,823.46	95
9. Ties	2,278,007.25	1,385
10. Rails	8,520,625.03	5,182
11. Track fastenings	1,063,620.96	647
12. Frogs and switches	255,243.07	155
13. Track laying and surfacing	1,669,691.18	1,015
14. Ballast	1,524,759.29	929
15. Station buildings and fixtures	1,477,207.49	897
16. Engine houses and turntables	246,663.97	150
17. Engine and car shops	849,340.77	516
18. Shop machinery and tools	294,507.95	179
19. Water stations	325,042.66	198
20. Fuel stations	79,544.48	47
21. Fencing right of way	273,067.50	166
22. Snow fences, etc	130,494.72	79
23. Stock yards	31,064.11	19
24. Crossings, cattle guards and signs	101,860.54	62
25. Interlocking and signal apparatus	44,706.61	27
26. Docks, wharves and coal bunkers	1,015,566.29	617
27. Transfer boats and bargers	31,662.70	19
28. Section and tool houses	122,352.50	74
29. Miscellaneous structures	1,179,108.09	717
30. Telegraph lines	207,361.48	126
31. Transportation charges and rent of equipment	1,756,796.39	1,068
32. Operating expenses	261,910.26	159
33 Construction equipment	63,743.75	39
34. General expenses	640,744.02	390
35. Interest and discount	7,173,190.53	4,360
36. Legal expense	3,009.24	2
37. Undistributed expense	480,212.62	292
Total	$63,979,772.61	$38,895
38. Equipment (rolling stock)	11,478,121.38	6,978
Grand total	$75,457,893.99	$45,873

[1] *Engineering-Contracting*, Volume XXXIII, No. 2.

TABLES III AND IV.[1] COST OF REPRODUCTION AND PRESENT VALUE OF THE NORTHERN PACIFIC RY. IN WASHINGTON

(1645 Miles)

	Cost of reproduction new	Condition per cent.	Present value	Per mile of line[2]
1 Engineering (5 per cent. of items No. 3 to No. 27.)	$ 2,510,580	100.0	$ 2,510,580	$ 1,526
2. Right of way, etc	32,862,872	100.0	32,862,872	19,980
3. Clearing and grubbing	1,427,185	100.0	1,427,185	867
4. Grading	12,543,395	110.0	13,797,735	7,626
5. Tunnels	3,143,030	100.0	3,143,030	1,911
6. Bridges, trestles and culverts	7,776,348	84.7	6,586,567	4,728
7. Ties	3,307,875	50.0	1,653,938	2,011
8. Rails	8,854,680	80.0	7,083,744	5,384
9. Track fastenings	1,704,583	80.0	1,363,666	1,036
10. Frogs and switches	228,000	80.0	182,400	139
11. Ballast	1,981,000	100.0	1,981,000	1,206
12. Track laying and surfacing	1,543,675	100.0	1,543,675	938
13. Fencing right of way. (From accounting records plus 20 per cent.)	227,682	55.0	125,255	138
14. Snow fences and sheds. (From accounting records plus 20 per cent.)	156,595	72.0	112,748	95
15. Crossings, cattle guards and signs. (From accounting records plus 20 per cent.)	122,232	55.0	67,228	.74
16. Telegraph lines (From accounting records plus 20 per cent.)	248,835	75.0	186,626	151
17. Station buildings and fixtures	2,109,895	81.5	1,727,769	1,283
18. Engine houses and turntables	227,819	68.2	155,373	138
19. Engine and car shops	939,984	66.4	624,169	571
20. Shop machinery (from accounting records plus 20 per cent.)	353,408	65.0	299,715	215
21. Water stations (from accounting records plus 20 per cent.)	390,050	65.5	255,483	237
22. Fuel stations (from accounting records plus 20 per cent.)	95,453	77.5	73,976	58
23. Stock yards (from accounting records plus 20 per cent.	30,170	45.5	13,727	18
24. Interlocking and signal apparatus (from accounting records plus 20 per cent.)	53,648	85.0	45,601	33
25. Docks, wharfs and coal bunkers (from accounting records plus 20 per cent.)	1,216,680	75.0	912,510	740
26. Section and tool houses	146,853	61.0	89,580	89
27. Miscellaneous structures (from accounting records plus 20 per cent.)	1,382,530	61.0	843,343	840
28. Legal and general expense (1 per cent. of items No. 3 to No. 27).	502,116	100.0	502,116	305
29. Interest during construction (5 per cent. of items No. 1 to No. 28 except No. 2)	2,661,215	100.0	2,661,215	1,618
30. Stores on hand	530,677	100.0	530,677	322
Total of items 1 to 30	$ 89,279,065		$83,363,454	$54,277
31. Equipment	14,334,377	67.5	9,677,947	8,715
Grand total	$103,613,442	.....	$93,041,401	$62,992

[1] *Engineering-Contracting*, Volume XXXIII, No. 2.

[2] There are 1.34 miles of track per mile of line.

Beloit Water Gas and Electric Co.—Among the many examples that might be used to illustrate the methods of valuation employed by the Wisconsin Commission, the case of the Beloit Company has been selected because:

(a) It includes several classes of property, water works, water power, gas properties and electric plant.

(b) It discloses some of the latest approved unit prices and method of their make-up as used by the Commission in comparison with similar prices introduced by various engineers.

(c) It indicates the latest views of the Commission re-affirming in many instances, previous methods used in determining "fair value" with due consideration of working capital, "earning value," etc.

The city of Beloit, Wisconsin, appealed to the Railroad Commission of Wisconsin for a reduction in rates of water, gas and electric service supplied by the local company. Careful and exhaustive appraisals of the properties of the company were made, not only by the engineers of the Commission but also by several different engineers employed by the city and by the company. As indicating the care with which the work was done and to permit a comparison of the units and values used by the several engineers and the Wisconsin Commission in determining facts on which to base their decisions, a part of the data contained in the decision of the Commission, dated July 19, 1911, is here reproduced.

The Commission found that the rates charged were not proportioned in accordance with the cost of the service, and, therefore, ordered the introduction of water-meters and modification in the charges for water, gas and electric service. The cost of reproduction new of the entire physical property was found to be $894,204.00; and the present value $815,902.00, no allowance being made for pavement not being actually cut through and paid for by the company. The value of the gas plant, new, was found to be $321,380, existing value $300,609; but the value allowed, all things considered, was $310,000. In the same way the value of the electric plant, new, was found to be $264,883, existing value $225,772; but the total value allowed including part of the water power, was $270,000. Methods of evaluating water powers are discussed, in the printed opinion, at considerable length, the Commission stating "it appears that it is almost always necessary to fall back upon the method of calculating the

saving over steam power and then, by capitalizing this saving, arrive at the total value of the water power." Yet the Commission apparently makes no such allowance, saying:

"From the point of view of public policy it is questionable whether the allowance should exceed the cost of development and value of the physical property utilized," apparently basing this conclusion on the position taken in an earlier case where the Commission said: "If water rights are private property under the law, then all the benefits which accrue from these rights would probably go to their private owners. If, on the other hand, water power rights are public rights rather than private rights, then it would also seem that the public should share in any benefits that may be derived from such rights."

Apparently little or nothing was allowed for going value, the basis for such conclusion being the "earning value," the method of determining which, in line with previous decisions, from a consideration of early losses is clearly set forth in Table XXXVII. Working capital including stores and supplies on hand, was allowed to the extent of $40,000.00, that is, practically 5 per cent. of the present physical value. The usual addition of 12 per cent. was made to the net cost of the physical plant aside from paving, stores and supplies, to cover engineering, interest during construction, contingencies, organization, etc. Prices for material were largely made up by ascertaining market values, using the average price over a 5 year period, in case of commodities fluctuating in value, adding freight and costs of delivery at the site where used; then making a rather liberal allowance for estimated cost of labor of installation. In some instances the general contractor's price for equipment delivered and erected ready for operation was taken as the unit price, thus including the contractor's allowance for profit and contingencies, on top of which was further added the 12 per cent. covering engineering, additional contingencies, etc., in fact the unit prices usually adopted by the Wisconsin Commission are sufficiently liberal, as stated in this and other decisions, to cover "piecemeal" construction which would ordinarily include a contractor's profit as compared with the unit prices used in many cases by other commissions or appraisers in estimating reproduction values based on complete replacement at a given time.

Table XLV gives an interesting comparison of the investment in the relative parts of gas plants, as found by the Wisconsin Commission for towns in that state.

TABLE XXXVI.—TENTATIVE VALUATION OF PHYSICAL PROPERTY AS OF JUNE 30, 1910, AFTER ADJUSTMENTS AND CORRECTIONS

Classification	Water		Gas		Electric		Total	
	New	Existing	New	Existing	New	Existing	New	Existing
1. Land	$14,822	$14,822	$10,239	$10,239	$7,028	$7,028	$32,089	$32,089
2. Wells and suctions	14,780	14,423	.....	.....	.....	.....	14,780	14,423
3. Reserv., water tanks, hold	14,981	14,066	42,223	40,595	.....	.....	57,204	54,661
4. Dist. system	159,148	154,229	103,061	96,801	74,810	67,049	337,019	318,079
5. Power plant equipment	20,094	15,105	56,854	52,505	72,901	62,151	149,849	129,761
6. Bldgs. and misc. structures	17,975	14,617	31,293	27,134	35,956	22,456	85,224	64,207
7. Office furn. and appliances	979	783	979	783	979	783	2,937	2,349
8. Tools and instruments	931	475	1,627	887	1,464	878	4,022	2,240
9. Horses, wagons and misc	141	98	843	705	141	98	1,125	901
Total items 1–9	$243,851	$228,618	$247,119	$229,649	$193,279	$160,443	$684,249	$618,710
10. Add 12 per cent.[1]	29,262	27,434	29,654	27,558	23,194	19,253	82,110	74,245
Total items 1–10	$273,113	$256,052	$276,773	$257,207	$216,473	$179,696	$766,359	$692,955
11. Stores and supplies	4,170	4,117	13,347	13,282	10,636	10,189	28,153	27,588
Total items 1–11	$277,283	$260,169	$290,120	$270,489	$227,109	$189,885	$794,512	$720,543
12. Paving	540	540	1,978	1,978	.....	.....	2,518	2,518
Total items 1–12	$277,823	$260,709	$292,098	$272,467	$227,109	$189,885	$797,030	$723,061
13. Non-operating property	8,869	7,563	9,123	7,983	7,349	5,462	25,341	21,008
Total items 1–13	$286,692	$268,272	$301,221	$280,450	$234,458	$195,347	$822,371	$744,069
Additions Jan. 1, 1909–Jan. 30, 1910	21,249	21,249	20,159	20,159	30,425	30,425	71,833	71,833
Grand total	$307,941	$289,521	$321,380	$300,609	$264,883	$225,772	$894,204	$815,902

[1] For engineering and superintendence, interest during construction, contingencies, etc.

TABLE XXXVII.—EARNING VALUE—WATER, GAS AND ELECTRIC DEPARTMENTS AND OF THE UTILITY AS A WHOLE

	Period	Value of plant first of year	Additions during year	Depreciation	Interest and profit	Net receipts for year	Value of plant end of year	Average value for year
				1%				
Water	1906	$230,267	$10,866	$2,357	$16,499	$17,282	$242,707	$235,700
	1907	242,707	28,570	2,554	17,989	18,033	273,787	256,992
	1908	273,787	16,989	2,782	19,760	18,519	294,799	282,281
	1909[1]	294,799	4,563	1,445	10,398	10,145	301,060	297,080
	1910	301,060	16,686	2,986	21,658	19,730	322,660	309,403
				2%				
Gas	1906	$137,374	$2,494	$2,772	$9,703	$20,352	$131,991	$138,621
	1907	131,991	128,190	4,079	13,726	22,160	255,826	196,086
	1908	255,826	33,163	5,693	19,068	23,811	289,939	272,407
	1909[1]	289,939	6,988	3,047	10,270	13,640	296,604	293,433
	1910	296,604	13,171	6,296	21,223	28,309	308,985	303,189
				5%				
Electric	1906	$106,610	$33,392	$6,165	$8,631	$11,829	$142,969	$123,306
	1907	142,969	70,065	8,752	12,460	18,281	205,965	178,001
	1908	205,965	24,390	11,113	15,271	24,218	232,521	218,160
	1909[1]	232,521	22,255	6,139	8,527	15,731	253,711	243,648
	1910	253,711	8,170	13,040	18,046	35,088	257,879	257,796
				2.35%				
Utility as a whole	1906	$474,251	$46,752	$11,694	$34,834	$49,464	$518,067	$497,627
	1907	518,067	226,825	14,909	44,004	58,475	745,530	631,479
	1908	745,530	74,543	18,450	54,796	66,549	826,769	782,801
	1909[1]	826,769	33,806	9,861	29,528	39,517	860,447	843,672
	1910	860,447	38,027	20,567	61,502	83,127	897,476	879,460

[1] For 6 months—Jan. 1 to June 30.

TABLE XII.—COMPARATIVE TABLE OF WEIGHTS OF CAST IRON PIPE

	City				Staff Class B	Company
	Wheeler	Sturtevant	Evans	Fowle		
14", lb. per lineal foot...	102.5	117	100	117	102.5	102.5
12", lb. per lineal foot...	75	75	75	75	82.1	82.1
10", lb. per lineal foot...	60	60	60	60	63.8	63.8
8", lb. per lineal foot...	42	42	42	42	47.5	47.5
6", lb. per lineal foot...	33	33	33	33	33.3	33.3
4", lb. per lineal foot...	22	22	22	22	21.7	21.7
3", lb. per lineal foot...	17	16.2	17	17	16.2	16.2

TABLE XIII.—COMPARATIVE TABLE OF COST OF TRENCHING AND LAYING MAINS

	City					Staff	Company
	Wheeler	Sturtevant	Evans	Fowle	City average		
14-inch cast iron main, per ft...	$0.470	$0.460	$0.425	$0.420	$0.444	$0.580	$0.603
12-inch cast iron main, per ft..	.420	.410	.382	.380	.398	.535	.547
10-inch cast iron main, per ft..	.370	.360	.334	.340	.351	.485	.498
8-inch cast iron main, per ft..	.330	.325	.290	.300	.311	.435	.437
6-inch cast iron main, per ft..	.280	.270	.255	.260	.266	.405	.405
4-inch cast iron main, per ft..	.250	.245	.220	.230	.236	.370	.370
3-inch cast iron main, per ft..	.230	.225	.212	.210	.219	.350	.350
3-inch wrt. iron main, per ft..	.250	.200	.....	.....	.225	.....	.315
2-inch wrt. iron main, per ft..	.....	.185	.....	.....	.185	.....	.305
1¼-inch wrt. iron main, per ft.	.....	.180	.....	.....	.180	.....	.300
1¼-inch wrt. iron main, per ft.	.....	.175	.....	.....	.175	.....	.300

TABLE XIX.—COMPARISON OF HOLDER VALUES

Classification	City		Staff	Company
	Evans	Fowle		
REPRODUCTION VALUE				
Tank of 56,000 cu. ft. holder	$3,100	$4,000	$5,600	$9,245
Metal work of same	4,000	4,200	4,200	4,200
Foundation of 300,000 cu. ft. holder	2,250	2,550	2,800	2,650
Metal work of same	26,800	24,000	29,500	30,000
Water in tank of same	123	123	123	162
Total reproduction value	$36,273	$34,873	$42,223	$46,257
PRESENT CONDITIONS—PER CENT.				
Tank of 56,000 cu. ft. holder	80	70	83	85
Metal work of same	80	70	83	85
Foundation of 300,000 cu. ft. holder	100	98	100	100
Metal work of same	100	98	100	100
PRESENT VALUES				
Tank of 56,000 cu. ft. holder	$2,480	$2,800	$4,648	$7,866
Metal work of same	3,200	2,940	3,524	3,623
Foundation of 300,000 cu. ft. holder	2,250	2,499	2,800	2,650
Metal work of same	26,800	23,520	29,500	30,000
Water in tank of same	123	121	123	162
Total present value	$34,853	$31,880	$40,595	$44,301

TABLE XXI.—GAS DEPARTMENT, DISTRIBUTION SYSTEM

Price of Cast Iron Pipe

Classification	City			Staff	Company
	Evans	Fowle	Average		
8 in. main per ton	$29.80	$29.31	$29.55	$30.48	$30.90
6 in. main per ton	29.80	29.31	29.55	30.49	30.01
4 in. main per ton	30.80	30.31	30.55	31.47	31.99
3 in. main per ton	30.80	30.31	30.55	31.47	31.99
Specials	50.00	60.00	55.00	60.00	60.00
Cartage per ton	.50	(1)	.50	.50	.75

[1] 50 cents. per ton included in unit price.

TABLE XXII.—GAS DEPARTMENT, DISTRIBUTION SYSTEM

Price of Wrought Iron Pipe

Classification	City			Staff	Company
	Evans	Fowle	Average		
8 in. W. I. pipe, per foot	$0.85	$0.846	$0.848	$0.846	$0.85
3 in. W. I. pipe, per foot	.19	.189	.1895	.204	.204
2 in. W. I. pipe, per foot	.09	.090	.090	.108	.123
2 in. Merchants' pipe, per foot				.972	.973
1½ in. Merchants' pipe, per foot	.068	.068	.068	.0729	.0729
1¼ in. Merchants' pipe, per foot	.0566	.056	.056	.0608	.0608
1 in. Merchants' pipe, per foot	.0415	.041	.041	.0446	.0446
Specials and fittings, per ton		159.00		90.00	
Freight and cartage	1.50	1.50	1.50	1.50	1.75

TABLE XXIII.—GAS DEPARTMENT, DISTRIBUTION SYSTEM

	City				Staff	Company
	Sturtevant	Evans	Fowle	Average		
COST OF TRENCHING AND LAYING MAINS						
8″ cast iron pipe, per foot	$0.245	$0.192	$0.20	$0.212	$0.355	$0.374
6″ cast iron pipe, per foot	.220	.169	.17	.186	.285	.317
4″ cast iron pipe, per foot	.200	.137	.15	.162	.240	.256
3″ cast iron pipe, per foot	.175	.1325	.14	.149	.220	.223
8″ wrought iron pipe, per foot					.250	
3″ wrought iron pipe, per foot	.140	.1056	.115	.120	.175	.188
2″ wrought iron pipe, per foot	.125	.0900	.100	.105	.165	.175
1½″ wrought iron pipe, per foot	.115	.0875	.095	.099	.165	.170
1¼″ wrought iron pipe, per foot	.115	.0845	.090	.0965	.160	.170
1″ wrought iron pipe, per foot		.0820	.090	.086	.160	.170
TRENCHING AND LAYING SERVICES						
2″ wrought iron pipe, per foot		$0.086	$0.090	$0.088	$0.145	$0.16
1½″ wrought iron pipe, per foot		.084	.090	.087	.140	.16
1¼″ wrought iron pipe, per foot		.082	.085	.084	.140	.16
1″ wrought iron pipe, per foot		.080	.085	.082	.135	.16
¾″ wrought iron pipe, per foot		.080	.085	.082	.135	.16

TABLE XLV

Wisconsin Gas Plants

Distribution of Investment

	Thous. of total (excl stores)	Per cent. of total investment in												
		Land	Buildings	Plant	Station	Holder	Mains	Services	Meters	Dist. system	Office	Tools	Miscellaneous	Stores
Ripon	32.56	4.75	9.70	11.04	25.49	9.55	43.57	10.50	8.50	62.57	1.24	.76	.39	5.76
Chippewa Falls	45.78	2.31	10.40	20.52	33.23	22.99	29.67	3.46[1]	7.19	40.32	.93	2.21	.32	8.60
Ashland	61.43	3.64	5.40	13.90	22.94	21.14	32.50	9.12	9.78	55.02	.34	.56	.....	3.93
Manitowoc	131.53	5.04	5.22	11.47	21.73	9.65	44.94	7.96[1]	13.11	66.41	.96	.96	.29	3.90
Janesville	193.61	3.25	5.11	11.11	19.47	20.48	36.80	10.02	10.62	58.16	.91	.82	.16	3.30
LaCrosse	203.21	5.76	9.04	20.55	35.35	10.62	35.42	5.38[1]	11.24	52.04	.77	1.09	.13	1.06
Kenosha	213.75	1.40	3.41	10.78	15.59	4.45	49.02	14.21	14.33	78.49	.65	.70	.12	4.33
Superior	214.83	1.00	2.31	10.86	14.17	18.51	37.30	10.96	12.36	65.94	.50	.46	.42	3.77
Beloit	246.82	4.15	12.82	23.03	40.00	17.11	25.00	12.66[2]	4.10	41.76	.40	.73	.....	.....
Appleton	262.18	1.74	7.43	11.47	20.61	6.76	46.47	12.09	12.42	70.98	.31	.88	.43	3.89
Madison	337.32	8.59	5.77	22.57	36.93	10.95	32.23	7.94[1]	9.41	49.58	.69	.80	1.05	.....
Racine	780.35	5.41	8.04	18.71	32.16	17.77	26.39	7.45	9.63	48.49[3]	.48	.79	.31	5.21
Average	.....	3.92	7.05	15.50	26.48	14.17	36.61	9.31	10.22	57.48	.68	.90	.36	4.38
Minimum	.....	1.00	2.31	10.78	14.17	4.45	25.00	3.46	4.10	40.32	.31	.46	.12	1.06
Maximum	.....	8.59	12.82	23.03	40.00	22.99	49.02	14.21	14.33	78.49	1.24	2.21	1.05	8.60
Median	.....	3.90	6.60	12.69	24.22	14.03	36.11	9.57	10.20	56.59	.67	.80	.32	3.92
Mode	.....	.....	5.40	11.40	21.00	.....	36.40	.....	9.60	.....	.....	.80	.36	3.90

[1] Street portion only. [2] Includes cost for governors and connections. [3] Includes Racine-Kenosha high pressure line.

INDEX

Application of depreciation, 196
of principles outlined, 154
of terms, 13
Appraisals of public utility properties in Greater New York, 218
of steam roads in Michigan, 370
Appreciation, 210
Assumptions as to existing plant, 154
Averages, 29

Basis, 9
Beloit Water, Gas & Electric Co., 378
Beginning of operation, 155
of different portions of comparative plant, 158

Chapter I, 1
Chapter II, 13
Chapter III, 32
Chapter IV, 49
Chapter V, 62
Chapter VI, 91
Chapter VII, 129
Chapter VIII, 168
Chapter IX, 218
Chapter X, 333
Character of plant and order of construction, 155
Class of depreciation, 23
Commission decisions:
Appraisal of steam railroads in Michigan, 370
Beloit Water, Gas & Electric Co. R. R. Com. of Wis., 378
Buffalo, Rochester & Eastern, P. S. C., N. Y., Second District, 113
Case 74, Binghamton Light, Heat & Power Co., P. S. C., N. Y., Second District, 7, 41
Case 351, Monheimer *vs.* Brooklyn Union Elevated Co., etc., P. S. C., N. Y., First District, 94, 117
Case 420, Coney Island and Brooklyn Railroad Co., P. S. C., N. Y., First District, 119
Case 1134, Coney Island and Brooklyn R. R. Co., P. S. C., N. Y., First District, 293
Case 1181, Third Ave. R. R. Co., P. S. C., N. Y., First District, 9, 84, 92, 115, 220, 260, 261, 270
Case 1260, Baltz *vs.* Brooklyn Borough Gas Co., 210
Case 1273, Mayhew *vs.* Kings County Lighting Co., P. S. C., N. Y., First District, 86, 115, 126, 167, 210, 301
Case 1305, Metropolitan Street Railway Co., P. S. C., N. Y., First District, 280
Case 1364, Third R. R. Co., P. S. C., N. Y., First District, 272
Cashton Light & Power Co., R. R. Com. of Wisconsin, 138
City of Dodgeville *vs.* Dodgeville Electric Light & Power Co., R. R. Com. of Wis., 26, 198
City of Knoxville *vs.* Knoxville Water Co., 141, 207, 209
City of Ripon *vs.* Ripon Water Co., R. R. Com., of Wisconsin, 114

Contingencies, 67
Cunningham *vs.* Chippewa Falls Water Works & Lighting Co., R. R. Com. of Wisconsin, 23
Darlington Electric Light & Water Power Co., R. R. Com. of Wis., 204
Decisions of commissions (see Commission Decisions)
Decision of courts (see Court Decisions)
Fair return, 20
Fair value, 20
Fair rate, fair value, fair return, 20
Fon du Lac Water Co., R. R. Com. of Wisconsin, 119
Franchises, good will, going value, contracts, 129
Fullmer *vs.* Wausau Street R. R. Co., R. R. Com. of Wisconsin, 172
Hill *vs.* Antigo Water Co., R. R. Com. of Wisconsin, 97, 118, 146, 148, 172
Income on unemployed capital, 160
Index, 387
Kaukauna Gas, Electric Light & Power Company, R. R. Com. of Wis., 89
Kennebec Water District *vs.* Waterville, 139
Long Acre Electric Light & Power Co., P. S. C., N. Y., First Dist., 41
Macon Gas, Light & Water Co., Georgia Board of Arbitrators, 349
Metropolitan Trust Co., *vs.* Houston & T. C. R. R. Co., 141
Minneapolis, St. Paul & Sault Ste. Marie Railway Co. *vs.* Railroad Commission of Wisconsin, 39
Monheimer *vs.* Coney Island and Brooklyn Railroad Co., P. S. C., N. Y., First District, 96, 98
Northern Pacific Railway, R. R. Com. of Washington, 374
Omissions, 67
Paulhaumus *vs.* Puget Sound Electric Railway, Railway Com. of Wash., 121
Queensborough Gas & Electric Co., P. S. C., N. Y., First District, 93, 121
Rates for Electric light and power, P. S. C., St. Louis, 210
Reserve funds, 193
Rochester, Corning, Elmira Traction Co., P. S. C., N. Y., First District, 95
State Journal Printing Co. *vs.* Madison Gas & Electric Co., 9, 82, 84, 97, 115, 127
Street railway properties in Chicago, traction commission, 333
Union Electric Light & Power Co., St. Louis P. S. C., 345
Coney Island & Brooklyn R. R. Co., 293
Construction period required, 155
Contractor's profit, 64
Contracts, 129, 166
Cost of appraisals, 52
of financing, 118
Cost to replace new, replacement cost or cost of reproduction, 18
Court decisions:
Ames *vs.* Union Pacific Railway Co., 205
Binghamton Light, Heat & Power Co. *vs.* Stevens, 200
Bristol *vs.* Bristol Water Works, 139
Brunswick and Topsham Water District *vs.* Maine Water Co., 17, 110
Cedar Rapids Gas Light Co. *vs.* City of Cedar Rapids, 17, 84

City of Danville et al. *vs.* Southern Railway Co. et al., 123
Cleveland, Cincinnati, Chicago & St. Louis Railway Co. *vs.* Backus, 51
The Columbus Railway & Light Co. *vs.* City of Columbus, Circuit Court of the U. S. Southern District of Ohio, Eastern Division, 5, 98, 119, 172, 199
Columbus Southern Railroad *vs.* Wright, 72
Consolidated Gas Co. *vs.* City of New York, 73, 125, 129, 131, 136, 206
Cotting *vs.* Kansas City Stock Yards, 11, 73, 210
Covington and Lexington Turnpike *vs.* Sanford, 21
Des Moines Water Co. *vs.* City of Des Moines, 91
Hamilton Gas Co. Ltd. *vs.* Mayor, Councillors and Burgesses, 142, 143
Milwaukee Railway & Electric Light Co. *vs.* City of Milwaukee, 8, 128, 204
M. K. & T. Railway Co. *vs.* Love, 142
Omaha *vs.* Omaha Water Co., 28, 138, 141, 172
Perth Gas Company Ltd. *vs.* Mayor & Councillors, 143
Pioneer Telephone & Telegraph Co. *vs.* Westenhaven, 110, 150
Smyth *vs.* Ames, 9, 86
Weatherly *vs.* Capital City Water Co., 28
Wilcox *vs.* Consolidated Gas Co., 16, 87, 130, 138

Date of valuation, 155
Depreciation, 22, 168
accounts or reserve funds, 193
of non-physical values, 215
Development expenses, 19, 91
intangible expenses, non-physical costs, overhead expenses, 91

Engineering, contingencies, omissions, etc., 67
Examples of important appraisals, 333

Field inspection, 57
Fifty per cent. method, 211
Figure 1, 66
Figure 2, 66
Figure 3, 149
Figure 4, 154
Figure 5, 170
Figure 6, 178
Figure 7, 202
Figure 8, 352
Fluctuating prices, 65
Franchises, 22, 129

General, 49, 91, 168
Going value, 26, 139
development period, 155
Good will, 21, 129, 137

Insurance, 116
Intangible expenses, 91
Interest, 110
Introduction, 1
Inventory, 54

Kings County Lighting Co., 301

Legal and organization expenses, 116
Loss of interest during construction, 158

Macon Gas Light & Water Company, Georgia, 349
Making an appraisal, 49
Metropolitan Street Railway Company, 280

New construction in going value development period ignored, 159

Non-existent property, 127
Non-physical costs, 91
Northern Pacific Railway, State of Washington, 374

Operations of comparative plant, 160
of existing plant, 159
Original cost, 18
Overhead expenses, 91

Paving, 83
Physical value, 14
Preface, v
Present value, 16
Public service commissions, 32
Public utility, 28
Purpose, 6

Real estate, 71
Reasons for the Creation of commissions, 36
Replacement cost, 18
Reproduction cost, 18
Resulting going value under first trial computation, 163
Results accomplished by commissions, 40

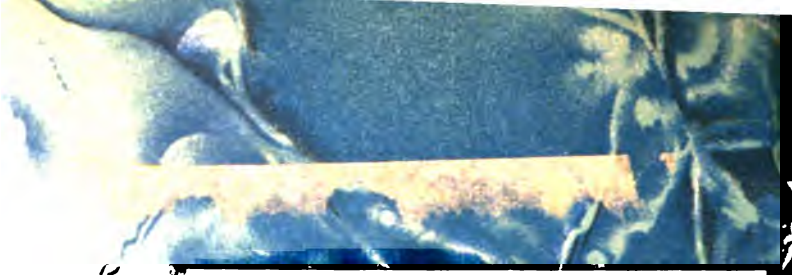
Scrap value, 15
Service value, 16
Street railway properties in Chicago, 333
Structural costs, 62
Suggested procedure, 59
Summary, 216
of units, 224

Table I, General statistics relating to assumed waterworks plant, 156
Table II, Interest during construction and progressive amount of investment, 157
Table III, Comparative plant, 158
Table IV, Existing plant, 159
Table V, Comparative plant, 160
Table VI, First trial computation of net annual income of comparative plant, 161
Table VII, First trial going value computation as of Jan. 1, 1910, 162
Table VIII, Accumulation, 180
Table IX, Annuity, 184
Table X, Approved rates used in estimating theoretical depreciation, 188
Table XI, Comparative methods of caring for depreciation, 195
Table XII, Rates of depreciation in use, 199
Table of contents, vii
Taxes, 115
Third avenue railroad company, 218

Union Electric Light & Power Co., St. Louis, Mo., 345
Unit prices, 62
Utility commissions, 32

Value, 13

Water power, 87
Wearing value, 15
Working capital, 125



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